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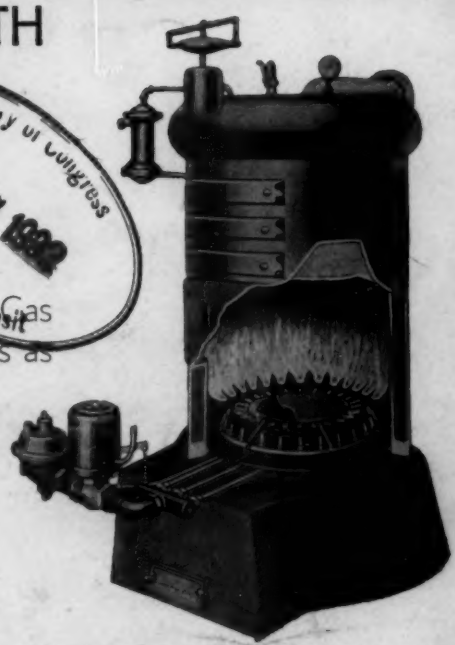

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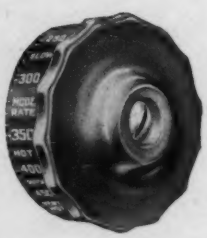

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AMERICAN
GAS JOURNAL
Established 1859 — *Pioneer of the Gas Industry*

Manufactured and Natural Gas

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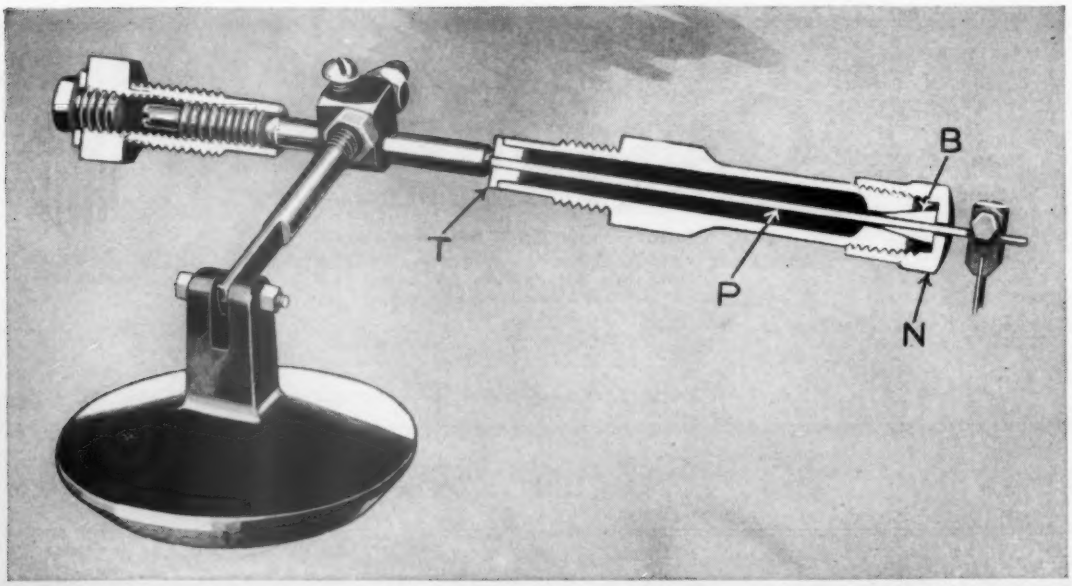
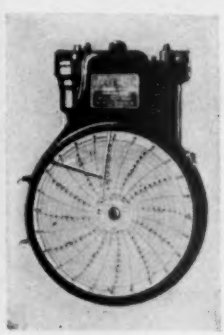


DEPENDABLE

Dependability is virtually a part of the design and construction of Westcott Orifice Meters. There is but one movable joint from the float to the chart record.

The heat treated stuffing box, for instance, is of hardened stainless steel and is equipped with a heat treated stainless steel bushing B. This is lapped on bearing shaft P and adjusted by means of N until the clearance is such that air passes at the rate of 0.5 to one cubic foot per hour at 700 pounds when dry.

The stuffing box is subsequently filled with grease, thus preventing any leakage. Other interesting features found in Westcott Orifice Meters include the forged steel mercury chambers, the high pressure chamber of which in the 50" and 100" sizes for example is interchangeable.



Dependability in every part and function is reflected in low maintenance and economical accurate operation. Bulletins E-2 and 16 describe other known factors in the value of Westcott Orifice Meters and Metric Integrating Orifice Meters.

Copies will be sent on request.

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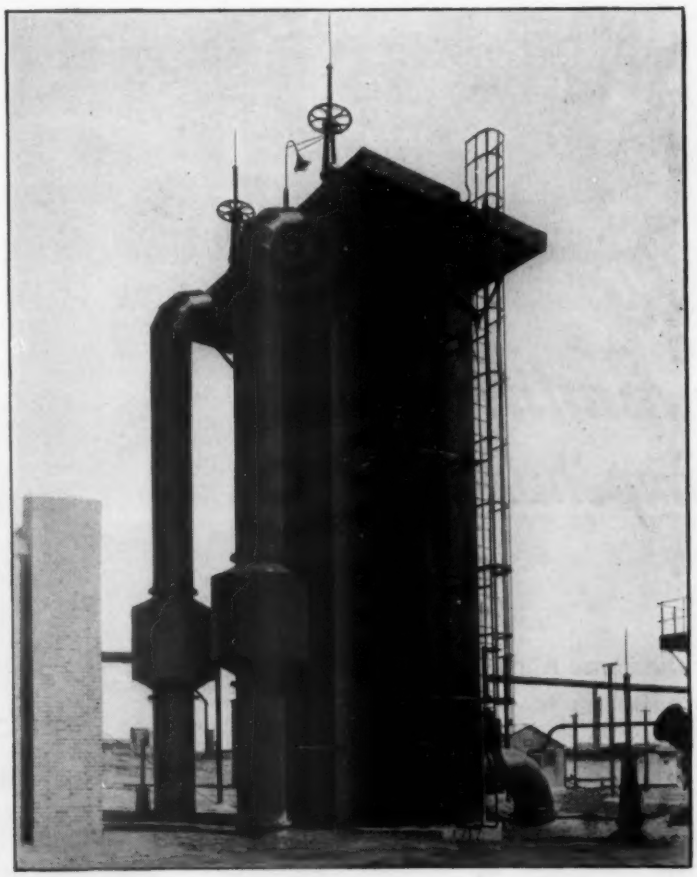

This installation shows two units each capable of handling 12,000,000 cu. ft. of gas per day

•

Thorough Removal
Low Oil Consumption
Counter Flow Principle
Simple Operation

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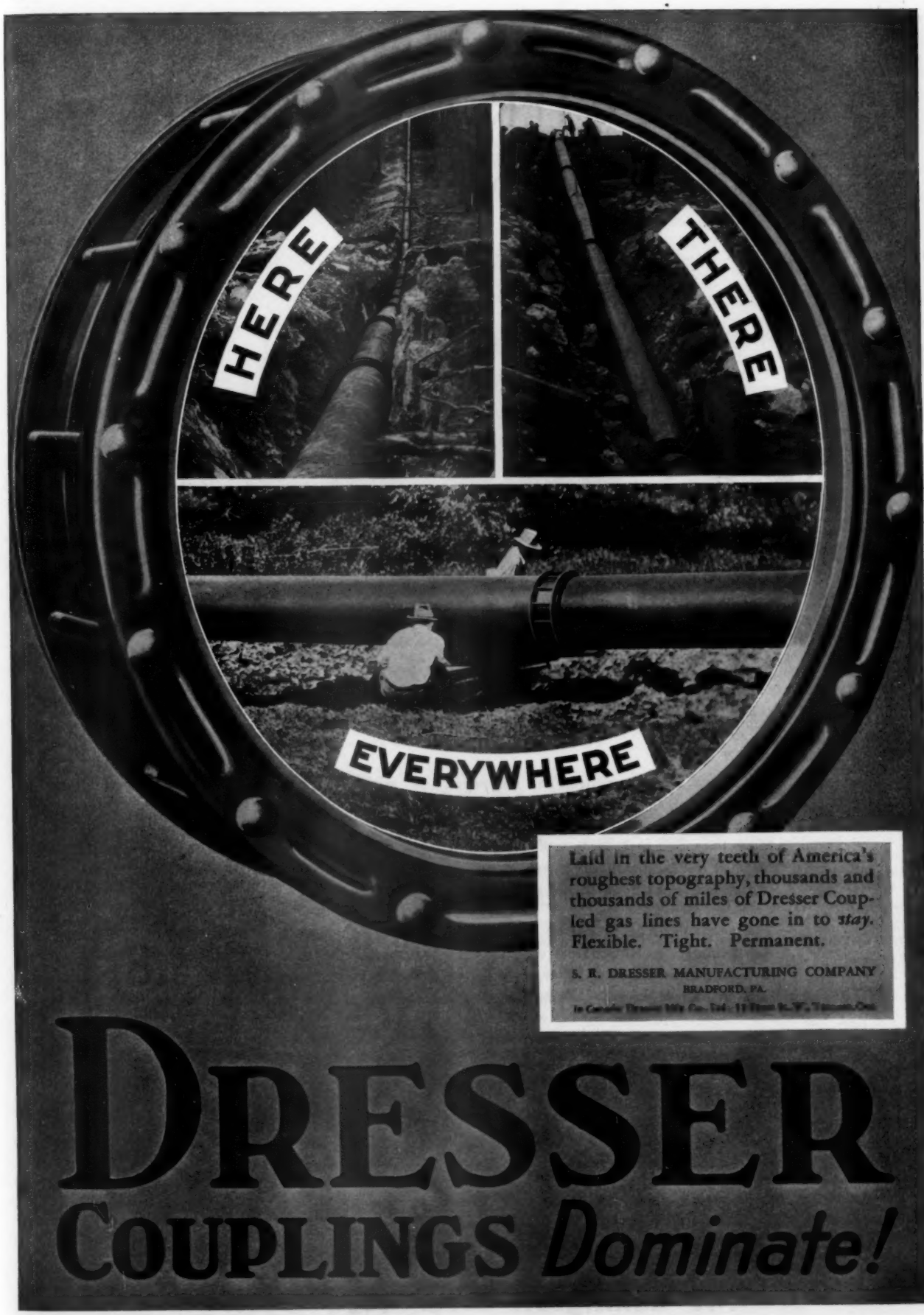
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COUPLINGS *Dominate!*

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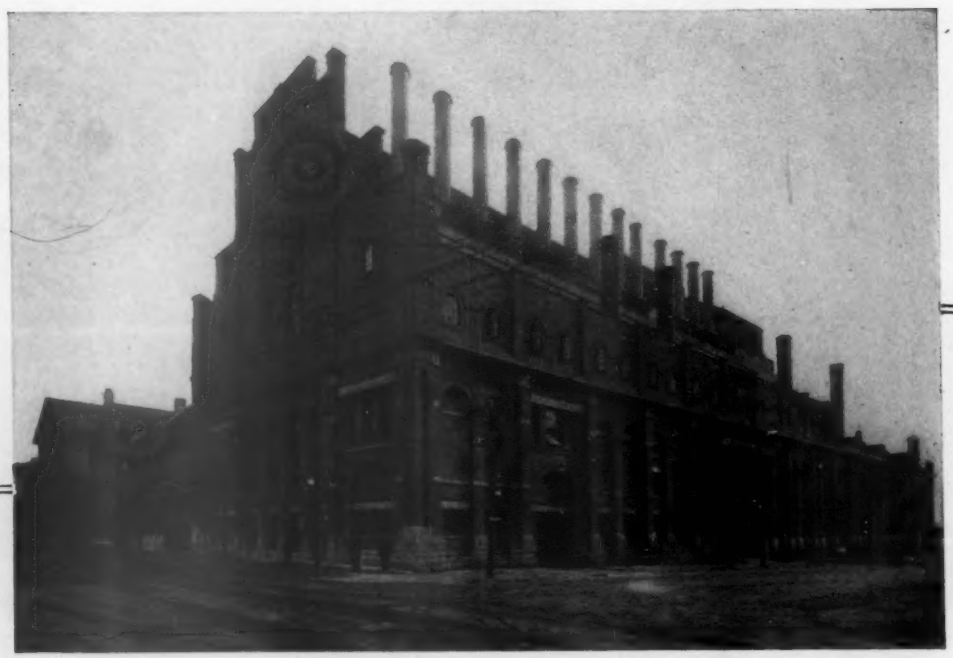
in ALL CONDITIONS REGARDLESS OF SIZE



IN these days, executives and engineers can wisely consider the exceptional operating economies of Glover-West vertical retorts.

More than 300 installations of the Glover-West System of carbonization have been built and each of these installations has demonstrated its ability to operate at minimum cost, regardless of size of plant or working conditions.

This economy is partly due to the fact that the heat of outgoing coke is used for preheating the secondary air; heat from waste gases is recovered and used to warm incoming coal and to operate a waste heat boiler. Heat from radiation is minimized by the free use of insulation on the benches. All this saves producer fuel and lowers manufacturing costs.

The advantages of Glover-West vertical retorts are real and worth investigating.

There are over 300 installations in all parts of the World, successfully carbonizing all classes of coal and ranging in capacity from 100,000 to 17½ million cubic feet per day.

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BUILDERS OF COAL GAS PLANTS

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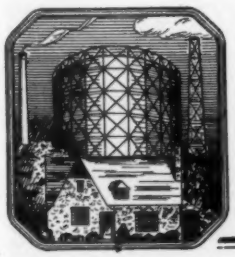


As We See It

Raising the Morale

SO many folks are in the dumps and feeling low on account of business that you can scarcely chide them for digging down into their pockets for the wherewithal to purchase a package, for instance, of Potent Pellets for Palsied People, when they note the alleged virtues of the same emblazoned across the drug store window. And yet, a good morning's bath of hot water, supplied by the never failing gas water heater, might pep them up a deal better than the aforesaid electuary—and cost considerably less.

It might be in order for gas companies to stress in their literature and window trims the value of the hot morning or evening bath for the worried business man.

Avoiding the Bumble Bees

CONGRESS has gone. The late and unlamented departure of Federal law makers from Washingon is but the closing of one of the gas industry's episodes in public relations. Now begins another—the campaign year.

In this particular season there will be more than ever a tendency to draw public utility companies into partisan national politics, as well as into many state and local controversies. It is inevitable that electric enterprises, and particularly public utility holding companies, face some of these issues. The differences in point of view between Franklin D. Roosevelt and Herbert Hoover are so outstanding that some of these national enterprises are almost inevitably partisan.

Fortunately the gas man does not need to share these troubles. We believe that the gas industry will this year do very well to say when utility matters arise—"Oh yes, we are somewhat interested; but you know, that is really an electric problem" Our electric friends seem to have dragged down around us most of the hornets' nests out of which irate politicians buzz. Why not let them be the only ones to get stung? We need not run in ultra-timid fashion. But we can wave our straw hat, farmer style, and switch the bumble bees aside on the assumption that they are not a part of our worry.

A Good Message to Broadcast

CAMPAIGN issues contain many things of even greater interest to gas men than the questions of public utility regulation. Taxes and taxation policies are among the outstanding of these questions to which we can very safely address ourselves.

It is a strange thing how in different communities little things often become the big issues. This is unfortunate. Gas men may at times be able to correct such a situation. It would be a fine thing if gas men generally would use their strongest influence to make economy in public expenditure a basic, if not a dominating, question in local politics.

Railroad executives have made a great issue out of the fact that taxes often take more than half of their net revenue. Some gas companies could do some similar calculating and spread the results in the daily papers to very good advantage. Why not make a local issue of our own? Let's say

"We believe in public improvements, but only what we can afford."

Why not show that your company pays out more money for taxes than it does for dividends? We would be willing to wager that it was twice as much. We doubt if the average gas-bill payer knows this. It would not hurt him at all to learn a few such facts.

A Hard Problem to Solve

OFFICIAL buck passing is not a new thing in public utility regulation. A new example in the nation's capital does, however, deserve our notice as an unqualified exhibition of official timidity. We refer to the recent communication from the Public Utilities Commission of the District of Columbia to the Washington Gas Light Company, undertaking, as the news reports say, to place "the sole responsibility of providing adequate gas service . . . upon the Washington Gas Light Company."

This company wished to build a ten million foot holder. It proposed one very sane and reasonable location, but the neighbors raised such a fuss that the Commission refused approval of the construction plans. Other proposals were equally unacceptable to other neighbors, even when the holder was shrunk to five million cubic feet capacity. Finally it became evident that the holder could not be built in time to do any good for the be built in time to do any good for the winter peak, and the company withdrew its application for a construction permit. Now comes officialdom with its formal emphasis that the company must take full responsibility for delivering gas in adequate supply, even though it is not permitted to do business in an intelligent and effective fashion.

It would be lovely if such matters could be handled in a business-like way. Certainly it is disgusting that petty local politics should be allowed to interfere with sound engineering judgment. The nation's capital, supposedly free from politics, is apparently just as bad, perhaps worse, than many other locations in this regard.

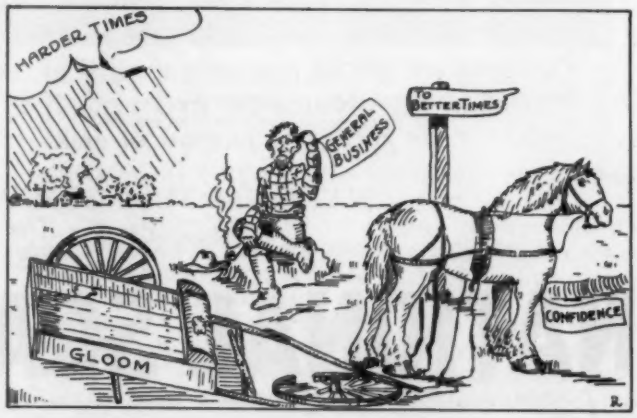
Some sort of prize should be given to anyone who will propose an unfailing remedy for these conditions.

Test Them With Overalls

A YOUNG college chap, a friend of ours, was looking for a job. We sent him to see the chief engineer of a nearby gas company. He got a job there greasing service cocks. Now he is bossing service ditch digging and at times wrangling with paving foremen who insist on disrupting gas service by steam shovelling the gas mains, as well as the pavement, out of streets undergoing repair.

This young chap was graduated in chemical engineering. Any kind of a job looked good to him. It was just luck that we happened to send him to the gas company at the right moment. But we opine it will be quite as good luck for the gas company as it was for the lad.

We wonder how many other gas companies should not obtain their so-called "labor" from the ranks of young college men. We have a feeling that in the future such youngsters will prove to be the most valuable of raw material for strictly engineering activities of the industry. Never before has there been such a chance to try out this theory on a big scale. Today there is. We suggest that you "Give the college boys a pair of overalls."



In a pinch, Dobbin might make a good saddle horse.

GOOD PIPE

GOOD clothes can not be woven from poor thread. Nothing excellent can be made of unworthy materials. The greatest skill and care that a contractor can devote will not make a piping system last beyond the durability of the pipe that he installs. Good pipe, correct planning, and sound workmanship are all indispensable to a satisfactory job. And of these, the first is good pipe.

An important requisite of good pipe for gas systems is that it must resist corrosive influences. This necessitates that the pipe receive special treatment toward this end. The Spellerizing and the Scale Free Processes are special processes applied to NATIONAL Pipe (butt-weld sizes ½ to 3-inch) for the particular purpose of making it resistant to corrosion, especially "pitting". Spellerizing works or kneads the surface of the metal, giving it a dense, compact, homogeneous character, better able to resist corrosive influences. The Scale Free Process removes the welding scale which forms on the surface of the skelp in the welding furnace, leaving the pipe clean and smooth, with no scale to cause "pitting" or to clog small orifices.

Pipe that is made from uniformly high grade materials, with modern equipment under long trained and skilled supervision, plus special processes to minimize corrosion, is *good pipe*. When specifying pipe for any gas installation, be sure to say NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY · PITTSBURGH, PA.

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NATIONAL SCALE FREE PIPE

All National Galvanized Pipe is given a special chromate treatment to resist discoloration and the formation of white rust. This patented process preserves that smooth, glistening surface or metallic luster characteristic of good galvanizing practice.

Vol. 137 No. 2
August, 1932

AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry

HENRY M. RILEY
Editor

Pipe Line Protection

Novel method of guarding against soil corrosion to be used on San Diego line

F. A. HOUGH

Distribution Engineer,
Southern Counties Gas Company

Using the most modern devices for design and location of the new 80-mile natural gas line of 12-inch diameter, San Diego, California, has resulted in several interesting features. These were described by F. A. Hough, distribution engineer of the Southern Counties Gas Company, at the recent third annual Corrosion Conference of the Pacific Coast Gas Association held at Los Angeles.

Among the departures from ordinary practice are to be noted the manner of making a survey of the soil along the proposed route of the line and the use of cathodic protection or electrical drainage as an additional safeguard against soil action. These and other outstanding features are described in the following extracts from Mr. Hough's paper. The illustrations of test work and survey methods were furnished through the courtesy of Bureau of Standards engineers. Details of the Shepard survey method used were described in American Gas Journal, April, 1931, page 34.

The Shepard Earth Resistivity Meter in use in the open trench. This instrument was described on page 34 of the American Gas Journal of April, 1931.

A SOIL SURVEY was made with Shepard Earth Resistivity Meters (soil rods) to determine where and to what extent it will be necessary to protect the line. As a result of a similar soil survey now nearing completion, covering all territory supplied by the Southern Counties Gas Co., considerable data concerning the relation between the electrical resistivity of the soil and pipe-life are available. The correlation found in this survey between soil-rod readings and pipe-life has been good enough to give us confidence in the soil-rods. We have, therefore, given considerable weight to the results of the soil survey for the San Diego line.

That survey consisted of making earth resistivity measurements at locations approximately 600 feet apart along the route of the line. At each location two readings were taken; one at 15-inch depth, and one at 30-inch depth. These readings and notes concerning the type of soil, drainage, etc., together with the location of the test, were recorded in a field book and later transferred to a map drawn to a scale of 400 feet to the inch.

To make this survey two field crews consisting of two men each were used. On each crew was a man experienced in pipe line protection work and a helper. These crews worked under the supervision of A. B. Allyne.

Coating Selection

It was decided at the outset that no coating would be used that is not designed to adequately withstand soil stress. Such coatings are expensive and their use cannot be justified in very mild soils. The chief purpose of the soil survey was then, to classify the soil along the route of the line into two classes, a corrosive class in which a protective coating should be used, and a mild class in which bare pipe should be used. The soil survey also served to locate "hot spots" where an extra-heavy protective coating should be used. However, the substantial properties of the coatings adopted for general use and their high cost has restricted the use of an extra-heavy coating to a few locations where the soil is extremely corrosive and the line is to be covered with heavy pavement.

After the results of the soil-survey had been plotted on maps, the route was divided into sections in which all resistivities were found to be 10,000 or more ohm-cms and into sections in which resistivities fell below this value. In those sections where the resistivities equaled or exceeded 10,000 ohm-cms, bare pipe will be installed. In all other sections protected pipe will be installed.

All information we now have concerning the relation between soil resistivity and pipe-life indicates that we might have been justified in using a soil resistivity somewhat lower than 10,000 ohm-cms as a division point between protected and unprotected areas. However, the high cost of reconditioning lines in territory such as this line is to traverse and the promise of complete protection offered by the methods we are to employ in the protected areas, have prompted us to be very conservative in the use of bare pipe.

Leak clamps on an unprotected pipe line in a corrosive soil area. Such areas or "hot spots" can now be located by a soil resistivity survey and suitable protective measures taken at the time of installation to prevent excessive leakage and costly repairs.

The survey disclosed that there are 10 sections varying in length from 7,000 to 22,000 feet in which bare pipe can be installed in accordance with the policy just described. The total length of bare pipe to be installed is approximately 141,000 (24.8 miles), amounting to 31 per cent of the total length of the line.

One of the many tests of protective coatings which are being made by the Bureau of Standards in cooperation with the American Gas Association and the American Petroleum Institute to measure degree of corrosiveness of soils and means for preventing attack on pipe lines. Thousands of such samples have been buried and are dug up for inspection after intervals of several years.

In one instance the soil survey revealed that by changing the proposed route of the line from one side of the highway to the other for a distance of 15,000 feet, very corrosive soil, necessitating heavy protection, could be avoided and the line could be laid in soil so mild that no protection is required.

Soil Variability

After one has used the soil-rods for a time and has observed the extreme variability of soils in some locations, the anomalies that occur in the soil corrosion of pipe lines become understandable. The finding of a line badly corroded in one small area perhaps 2 feet long, and in perfect condition in adjacent regions is evidently caused, in some cases at least, by variations detectable by the soil-rods in the corrosive character of the soil.

If in the course of a soil survey a region is found in which the resistivity measurements vary a great deal from point to point, the only safe thing to do is to protect the pipe against the worst soil conditions.

In areas where the soil survey indicates that bare pipe can be installed we believe that it is not safe to install such pipe without first checking in the open trench the resistivity of the soil.

Protective Means to Be Employed

Approximately two-thirds of the coated portion of the line will be protected with a double coal tar coating over which an asbestos felt wrapper will be applied, and one-third with a coating consisting of:

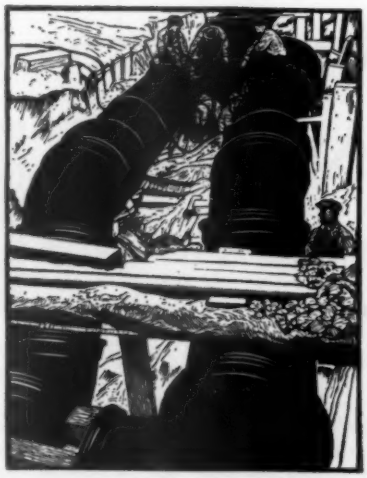
a. Asphalt primer
b. Hot coat of blended asphalt
c. Rag felt wrapper
d. Hot coat of blended asphalt
e. Rag felt wrapper
g. Kraft paper.

In the few places where extremely corrosive soils are encountered and the line is to be under pavement, a coal-tar coating will be used consisting of the coal-tar coating previously described (except that the wrapper will be bonded), to which another coat of enamel and another wrapper of asbestos felt will be added.

To supplement the protection afforded by these protective coatings, electrical drainage, or, as it is sometimes called, cathodic protection, will be employed. By

draining current from the pipe and returning it to the soil through a suitably designed electrode the potential of the protected portions of the line will be kept below that of the soil. Thus every pin hole, bruised spot or holiday in the protective coatings will be made cathodic and corrosion at these exposed points will be prevented.

The electrical methods to be used to protect the line from corrosion are to us the most interesting part of our plans. To our knowledge this is the first time that electrical protection has been included in the plan for a transmission line.



In this connection we wish to acknowledge our indebtedness to R. J. Kuhn of the New Orleans Public Service Co. and to Starr Thayer and S. U. McGary of the United Gas Public Service Co. These gentlemen have been pioneering in the use of electrical protection for gas transmission lines. It was from them that we got the idea of using such a method on the San Diego line and it is because of their liberality in giving us cost data, etc., obtained from their experiments, that we have felt justified in proceeding on a large scale with the method without having previously experimented with it.

Laboratory and field tests indicate that if the potential of steel buried in the soil is held at from 0.2 to 1.0 volt below the soil potential, all corrosion of the steel will be prevented. The minimum potential required for protection apparently varies with the character of the soil.

Dresser couplings with insulating gaskets are to be installed in each protected section about 40 feet from each end.

It appears now that there will be approximately eight sections to which electrical protection will be applied. These sections will vary in length from 4,000 feet to 75,000 feet. Our preliminary calculations indicate that the current that must be handled to protect the longest of these sections (14.2 miles) will at the outset not exceed 5 amperes, and the total resistance of the circuit will not exceed 2 ohms. Based on these two estimates, the estimated power consumption will be 50 watts. Assuming a rectifier efficiency of 20 per cent the A. C. power consumption will then be 250 watts, and the total annual energy consumption will be 2190 kw.h. At 5 cents per kw.h. the total annual energy cost will be $109.50 or $7.70 per year per mile of pipe protected. Considering the benefits derived, such as energy cost is negligible.

Selection of Coatings on Bureau Tests

The selection of the materials and the design of the coatings adopted were influenced very largely by the analysis of the results of the tests made by the United States Bureau of Standards, the American Petroleum Institute and the American Gas Association. These tests as yet cover too short a period of time to make possible the drawing of conclusions concerning all questions that arise during the selection of a coating. However, the great care and skill with which these tests are being conducted, and the lack of other sources of reliable information concerning the comparative value of coatings, make the progress reports of these investigations the most reliable source of information now available.

Unfortunately, our decisions regarding the protective coatings to be used could not be deferred for 4 or 5 years until these tests had been completed. Consequently some matters had to be decided on rather incomplete data. The men who have been conducting these tests are, of course, in no way responsible for our decisions as they have carefully pointed out that their data are as yet incomplete, and they themselves have refused to draw conclusions except concerning certain points about which they feel they have conclusive evidence. However, any merit there may be in our selection of coatings is to a considerable extent attributable to the investigations just referred to.

Gas Utility Revenues Show Drop in May

REVENUES of manufactured and natural gas utilities aggregated $52,065,947 in May, 1932, as compared with $57,020,099 in May, 1931, a decline of 8.7 per cent, according to reports from 413 companies serving 14,079,628 customers and representing 90 per cent of the public utility distribution of gas. For the first five months, revenues of these companies totaled $300,806,952, compared with $323,895,370 in the same period of 1931, a drop of 7.1 per cent.

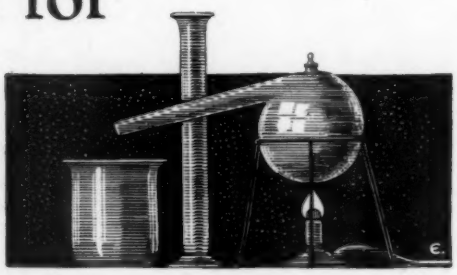
For May, the manufactured gas companies reported revenues of $31,783,721, or 5.6 per cent less than a year ago, while the natural gas utilities reported revenues of $20,282,226, a decline of 13.2 per cent. For the first five months, manufactured gas revenues registered a decline of 5.1 per cent and natural gas revenues a drop of 9.5 per cent.

Sales of manufactured gas reported for May totaled 29,613,647,000 cubic feet, a decline of 5.7 per cent, while natural gas utility sales for the month were 48,320,480,000 cubic feet, a drop of 15.6 per cent.

The decline in natural gas sales in May was the severest shown this year and was due to a contraction in all classes of sales. The drop in natural gas sales was general throughout the country with the exception of California, where an increase of 21 per cent in domestic sales and 62 per cent in commercial sales, offset declines in industrial sales and resulted in an increase of 1.4 per cent in total natural gas sales. Revenues of natural gas companies in California show an increase of 12 per cent for May and 15 per cent for the first five months.

Declines in manufactured gas sales were more or less general in May, particularly in those regions where large volumes of gas are sold for industrial purposes. However, manufactured gas sales on the Pacific Coast and in the West North Central states show slight increases in May and for the first five months, as compared with the same period of 1931.—*Paul Ryan, Statistician, A.G.A.*

An Alternative Routine for Natural Gas Analysis



EDWARD C. MATHIS

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ALTHOUGH it has been known for many years that there were present in natural gas paraffin hydrocarbons higher in the molecular series than methane and ethane, until recently their determination was beyond the scope of all but a very few gas laboratories, and these were of a research nature. Consequently the hydrocarbons in natural gas were generally reported as "total paraffins," or calculated to methane and ethane, the deficiency of which practice was recognized but for which there was no remedy.

Burrell and Oberfell[1] in 1915 first applied the methods of fractional distillation of liquefied gases to the separation of the hydrocarbons in natural and manufactured fuel gases. Previously there was no method of determining "the individual paraffins present in a gas mixture excepting there be not more than two present"[2]. Since that time there have been frequent improvements and simplifications made in the apparatus for liquefaction and distillation, which has been clearly traced by W. J. Podbielniak,[3] and others[4], [5]. There is now available on the market, ready manufactured equipment for this type of analysis and, although it is rather costly, requires an operator of above-the-average skill, is uncomfortably subject to breakage, and whose use requires for a single analysis from four to six hours, it is a praiseworthy achievement and fills a long felt need. Its employment is essential for purposes of tracing the progress of chemical reactions, for use in chemical engineering calculations and the like, in processes involving natural gas.

However, for the purposes of combustion calculations and for most gas distribution problems, a determination of the individual hydrocarbons is not essential, and the method to be described here answers such purposes completely, requires considerably less time for analysis and may be carried out on the common types of absorption and slow-combustion apparatus without alteration.

Method Applicable to Manufactured Gas

By this method it is possible to determine the B.t.u. per cubic foot, specific gravity, air required for combustion, combustion products, etc., limited in accuracy only by the precision of the analytical procedure. The method is also applicable to manufactured or mixed gases, but its accuracy in such cases is impaired by the recognized errors introduced during the absorption processes which are here pointed out. The text will be confined to natural gas but the application to other gases will suggest itself.

When it is not definitely known that the sample is a pure natural gas, it is advisable to make a preliminary examination for the components common to manufactured gas and absent in natural gas, namely carbon monoxide, hydrogen and the unsaturated hydrocarbons. It is assumed that the reader is familiar with the common absorption and combustion types of apparatus and their operation.

In the potassium hydroxide pipette, the presence or absence of carbon dioxide will be determined. Its presence does not necessarily mean that manufactured gas is mixed in the sample, because many natural gases contain it. Its absence, however, is good contributory evidence that a foreign fuel gas is absent.

Unsaturates Absent in Natural Gas

In the fuming sulfuric acid (or bromine) pipette any unsaturated hydrocarbons (illuminants) will be revealed. However fuming sulfuric acid partially absorbs the paraffin gases above ethane[6, 7] and even should there be no unsaturates present a slight contraction in volume, 0.1-0.4 cc., will often be noted for this reason. It is a belief, in which several authorities concur, that unsaturated hydrocarbons *do not exist* even in traces in natural gas. Burrell and Oberfell say[8] that they believe "that these constituents are not present in natural gas." O. M. Setrum states[9], "In our work of analyzing a large number of natural gases and natural gas liquefied condensates during the past several years, we have not found any indication of unsaturates being present." W. J. Podbielniak declares[10], "I have myself never found any trace whatsoever of unsaturated hydrocarbons in natural gas or natural gasoline, nor do I know of any instance of this having been done."

This weight of opinion is sufficient to indict if not convict natural gas as devoid of unsaturates. So, if no contraction is noted after the fuming sulfuric acid treatment, other than that which can be assigned to the solubility of the higher paraffins, it is further support in favor of the presence of natural gas only.

The presence of oxygen, as determined in the pyrogallol (or phosphorous) pipette, is not unusual, although more than likely it entered by infiltration of air. Its amount, as well as any carbon dioxide, will be recorded in the final report.

Carbon monoxide is sought in the cuprous chloride solution. It is never found in natural gas, but is found in every manufactured gas; therefore its presence will denote a manufactured gas admixture, its absence, a pure natural gas. The minimum amount of carbon monoxide which occurs in any manufactured gas is about 6%, so that even a 25-75 manufactured gas-natural gas mixture would show 1.5% carbon monoxide.

This concludes the preliminary examination which may require as much as 15 minutes. By assembling the

evidence from it, a decision whether or not manufactured gas is present may be readily reached.

Proceeding on the basis that no manufactured gas is present in the sample, discard the residue from the preliminary examination and take into the burette a fresh sample. Determine only carbon dioxide and oxygen, accurately of course. Absorption in fuming sulfuric acid and in cuprous chloride is omitted which eliminates the error due to absorption of higher paraffin gases in the former, and the probability of introducing some carbon monoxide into the sample from the cuprous chloride solution, unless the solution is strictly fresh, due to the establishment of vapor pressure equilibrium. Then too, it is claimed[8] that the higher paraffin gases are absorbed to some extent in this solution.

Record the amount of carbon dioxide and oxygen and proceed to the slow combustion of the residual gas which now consists of only paraffin hydrocarbons and nitrogen (includes other possible rare gases).

The objective of the combustion procedure is to determine the average molecular formula of the hydrocarbons and their volume, from which the B.t.u. per cubic foot, and specific gravity may be calculated, and all combustions calculations made therefrom. The theory of the procedure has been described elsewhere,[11, 12] but its application has been left somewhat obscure to the general industry, and a formula for calculating specific gravity has been lacking.

The usual routine of slow combustion is followed. Approximately 100 cc. of oxygen, measured accurately, is passed into the slow combustion pipette. Approximately 25 cc. measured accurately, of the residual gas from the absorption line is taken. As a means of diminishing the possibility of explosion, it has been found helpful to add a precisely measured amount, approximately 10 cc. of pure hydrogen, probably because it widens the range of inflammable limits, increases the rate of flame propagation and therefore more readily initiates and sustains combustion. This known quantity of hydrogen can later be easily calculated out.

After combustion, the contraction due to combustion is measured precisely and the carbon dioxide formed in combustion is determined by absorption in the caustic potash pipette. Needless to say, extreme care must be exercised in preventing any absorption of the carbon dioxide formed, before the combustion contraction is measured. All the necessary data is now at hand, but one or more check combustions is the best assurance of accuracy.

The general molecular formula for the paraffin hydrocarbon series is C_nH_{2n+2}. For methane n equals 1, ethane n equals 2, etc. A hypothetical molecular formula for a mixture of paraffins may be devised. For instance, two volumes of methane mixed with one volume of ethane would have the hypothetical formula $C_{1.34}H_{4.68}$ where n equals 1.34.

The general combustion equation for the reaction of paraffin hydrocarbons with oxygen is:

$$V.C_{2n+2} + \frac{[(3n+1)V]O_2}{2} = Vn.CO_2 + V(n+1)H_2O$$

in which V represents the volume (or number of molecular weights) of the paraffin hydrocarbons.

Before combustion, the volume of reacting gases are

V volumes of paraffins plus $\frac{3n+1}{2}$ V volumes of oxygen. After combustion, the water vapor condenses and there is left only Vn volumes of carbon dioxide. The difference between these two volumes is the contraction due to combustion:

$$\text{Volume before combustion} = V + \frac{3n+1}{2} V$$

$$\text{Volume after combustion} = Vn$$

$$\text{Contraction due to combustion} = V + \frac{3n+1}{2} V - Vn$$

Simplifying this equation and substituting CO_2 for Vn:

$$(1) \quad V = \frac{2 \text{ cont.} - CO_2}{3}$$

The CO_2 formed equals Vn, from which

$$(2) \quad n = \frac{CO_2}{V}$$

In equation *(1)* is substituted the contraction and the CO_2 in cubic centimeters as recorded from the burette readings and the value of V is obtained which is then placed in equation *(2)* from which the value of n is obtained. It must be pointed out that V represents the volume of paraffins in the quantity of gas used for combustion and must be converted to the basis of the original sample. An example will serve best to demonstrate the calculations involved. The preliminary examination has been made and the actual analysis is being carried on.

	Burette Reading	Volume in cc.
Absorption Routine		
Sample taken	100.0	
After KOH absorption	100.0	$CO_2 = 0.0$
After pyrogallol absorption	98.2	$O_2 = 1.8$
Residual gas from absorption		98.2
Combustion Routine		
Portion of residual gas for comb.		25.0
Hydrogen added (for safety)		11.8
Oxygen		95.4
Total volume involved before comb.		132.2
Volume after combustion	63.8	
Contraction due to combustion		68.4
After absorption in KOH	34.2	
CO_2 formed in combustion		29.6
Calculation		
Contraction due to combustion		68.4 cc
Contraction due to hydrogen (1.5 x 11.8)		17.7 cc
Contraction due to paraffin gases		50.7 cc

By equation *(1)*:

$$V = \frac{(2 \times 50.7) - 29.6}{3} = 23.93$$

By equation *(2)*:

$$n = \frac{29.6}{23.93} = 1.24$$

The value of V = 23.93 represents the volume of paraffins of the average molecular formula $C_{1.24}H_{4.48}$ present in the 25 cc. sample taken for combustion from

the 98.2 cc residual gas. In 98.2 cc of the residual gas there are:

$$\frac{23.93}{25.0} \times 98.2 = 94.0 \text{ cc of paraffin hydrocarbon gases.}$$

The analysis can now be summarized and recorded.

CO_2	0.0% by volume
O_2	1.8
$C_{1.24}H_{4.48}$	94.0
N_2 (by diff.)	4.2
	100.0%

Estimation of Heating Value

The heating value for the group of paraffin gases in B.t.u. per cubic foot at 60° F., 30 inches mercury and dry may be derived from either of the following straight-line equations by substituting the value of *n* therein:

(3-A) B.t.u. = 782.7 n + 222.0
(3-B) B.t.u. = 755.4 n + 253.6

Equation *3-A* was derived by using the heating values converted from data supplied by International Critical Tables[13] into the terms commonly used by the fuel gas industry. Equation *3-B* was constructed from heating values compiled by the United Gas Improvement Company.

	B.t.u. per c.f., 60°, 30", dry.	
	Int. Crit. Tables	U. G. I.
Methane	1004.7	1009.0
Ethane	1787.4*	1764.4
Propane	2571.9	2521.0
Iso-butane	3352.7	3274.0

Although the two equations differ only to the extent of about 2 B.t.u. in 1000 over the range of the values of *n* encountered in natural gas, both are given because no official action has been taken to designate "best" values for B.t.u. per cubic foot. The author feels that those converted from International Critical Tables offer the most unimpeachable standards, and would like to see them adopted, but he also recognizes that the U. G. I. values are in widespread use, so equations based on each are given.

Returning to the example, the value of $n = 1.24$ is substituted in equation *3-A*:

$$(782.7 \times 1.24) + 222.0 = 1192.5 \text{ B.t.u./c.f.}$$

But in one cubic foot of the example natural gas there is but 0.94 c.f. of the paraffin gases, and since these are the only combustible gases present, the heating value of the example gas is 1192.5 x .94 = 1121 B.t.u. per cubic foot.

Estimation of the Specific Gravity

The specific gravity of the group of paraffin gases may be derived from either of the following straight-line equations:

(4-A) Sp.Gr. = 0.5043 n + 0.0501
(4-B) Sp. Gr. = 0.4839 n + 0.0690

These equations were also derived from values reported in International Critical Tables[14] converted to terms of the gas industry, and the U. G. I. compilation respectively, for the reasons given in connection with the heating value equations.

	Specific Gravity.	
	Int. Crit. Tables	U. G. I.
Methane	.5544	.5529
Ethane	1.0587*	1.0368
Propane	1.5622	1.5206
Iso-butane	2.0673	2.0045
Based on air density in lb./c.f., 60-30, dry	0.076569[15]	0.07658

*Note—The heating value per cubic foot of ethane calculated from data in I. C. Tables is 1773.0, but it is the only one among the paraffin gases which does not satisfy the straight-line equation. Specifically, it is the density which shows the deviation, whereas the calorific value on a weight basis is quite precisely in line, but of course both physical values enter the calculation of volume heating value. Without further argumentation here, the author raises the question of a possible error in the reported density. Because of the faithful adherence to the straight-line relation, the values of 1787 B.t.u. per cubic foot and 1.0587 Sp. Gr. are used, rather than 1773 and 1.0491. Which ones will be finally adjudged correct is of small concern to the gas technologist because by using either of the values in the average natural gas, the results differ by only 0.2%.

The two equations give specific gravities which differ over the range of *n* values encountered in natural gases only to the extent of about 0.006, equation *4-B* giving the lower values.

Applying the value of $n = 1.24$ obtained in the example to equation *4-A*:

$$(0.05043 \times 1.24) + 0.0501 = 0.675$$

The specific gravity of the original natural gas may now be figured[16]:

Oxygen	1.105	x .018	=	.020
$C_{1.24}H_{4.48}$	.675	x .940	=	.634
Nitrogen	.970	x .042	=	.041
	1.000			.695 Sp. Gr.

Combustion Relations of the Paraffins in Terms of n

Volumes per Volume of Gas

Oxygen required	$\frac{3n+1}{2}$
Air required	$\frac{3n+1}{.42}$
Water vapor formed	$n+1$
CO_2 formed	n

Throughout this article all gas or air volumes are on the dry basis because results from the analytical procedure are on this basis.

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Horsepower Required to Compress Natural Gas

Report of Compressor Plant Committee, Pacific Coast Gas Association

THE investigation of "Horsepower Required to Compress Natural Gas" was started by last year's Committee, and its report dealt largely with theoretical values. Since any tests undertaken had to be made under actual operating conditions, it was felt that the precise measurement of gas volumes and of horsepower developed, presented insurmountable difficulties.

While bearing in mind the impossibility of making a precise investigation, the present Committee decided that information of some interest and value might be obtained by running a series of tests on which accuracy would be limited by the precision of the standard orifice meter. It seemed that this degree of accuracy would be acceptable, in view of the fact that such measurement is considered satisfactory for the purchase and sale of enormous quantities of gas every day. Engine indicator cards, carefully taken and measured, furnished figures of comparable accuracy on horsepower developed.

Thirteen tests were made: the first on a 160 H. P. unit at Los Angeles; the second on four 760 H. P. units at Kettleman Hills; the third on ten 160 H. P. and two 760 H. P. units at Ventura; and the balance on one 760 H. P. unit at Kettleman Hills. All of the units tested were of the direct-connected type, but the locations were selected to provide a wide range of operating conditions. The compression ratios varied from 1.39 to 5.30, which covers the practical working range for single stage compression fairly well.

Test Procedure

After the engines were warmed up, and operating conditions had reached equilibrium, a set of indicator cards was taken for power and compressor cylinders. Suction and discharge pressures, R. P. M., fuel, delivered gas volumes, and incoming gas temperatures were recorded. Engine constants were computed carefully to four significant figures, but extensions were made on the slide rule where convenient. The volume of gas delivered was arrived at by noting the volume passing the meter during the test run, and extending it to a 24 hour volume. A correction for temperature of incoming gas was applied to get the test results on the standard basis at which the theoretical values were computed, and bring out the effect of high inlet temperatures in reducing the volume delivered.

Table 1 gives the data gathered, from which the curves on Figure 1 were plotted. Sample calculations appear at the end of this report.

The values for theoretical horsepower required per million cu. ft. per 24 hours were taken from the 1931 report (p. 350, vol. 22, Proceedings P. C. G. A.), which

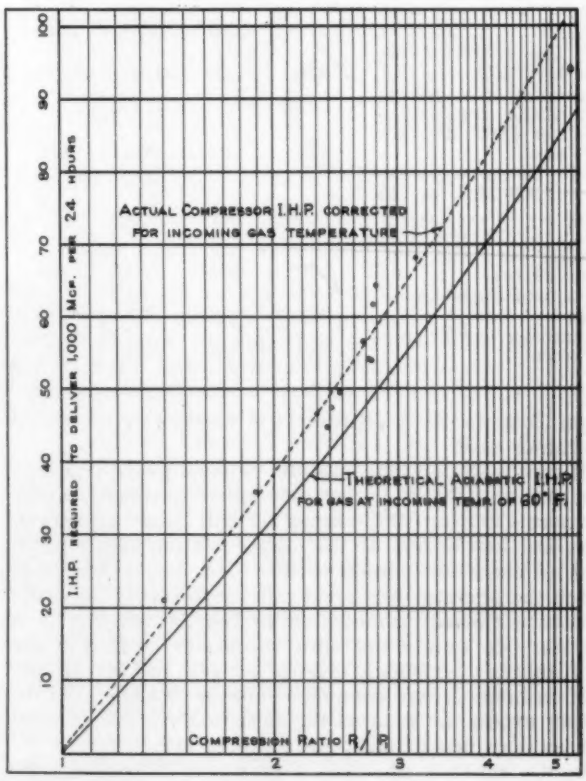

Figure 1

are based upon adiabatic compression where the ratio of specific heats is 1.265. Compressor efficiency is the ratio of the theoretical value, as obtained, to the compressor indicated horsepower.

An inspection of the graph shows that the points plotted do not fall upon a smooth curve. This was to be expected, as the measurements were made under actual operating conditions, and compressor efficiencies vary between limits of perhaps 80 to 95 per cent between overhauls. Since the dotted curve, representing 85% efficiency, appears to divide the points fairly well, it was selected as a fair working average. This value compares closely with the 83½% found by last year's Committee.

Fuel Required to Develop Horsepower

Closely allied with the question of horsepower required to compress natural gas is that of fuel required to develop the horsepower. The cost sheets show that the fuel bill constitutes a large proportion of the total operating cost, possibly from 30 to 50 per cent, and therefore the improvement of the thermal efficiency

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To be read before Annual Convention, Pacific Coast Gas Assn., Del Monte, Cal., Aug. 24-26, 1932.

Table 1—Horsepower Tests

	Run No. 2 2/9/32 Ingle.	Run No. 3 2/9/32 Ket.	Run No. 4 4/2/32 Ven.LP.	Run No. 5 4/2/32 Ven.HP.	Run No. 6 4/11/32 Ket.	Run No. 7 4/11/32 Ket.	Run No. 8 4/11/32 Ket.	Run No. 9 4/12/32 Ket.	Run No. 10 4/12/32 Ket.	Run No. 11 4/12/32 Ket.	Run No. 12 4/13/32 Ket.	Run No. 13 4/13/32 Ket.
Suction Pressure, lbs. per sq. in. gauge	8.1	299	30.5	107.5	149	151	149	131	131	131	140	207
Discharge Pressure, lbs. per sq. in. gauge	106	420	112.0	267	391	379	379	384	388	388	400	402
P_2/P_1 (Absolute)	5.3	1.39	2.80	2.30	2.47	2.38	2.41	2.73	2.76	2.76	2.68	1.88
Number of Units Operating	1	4	10	12	1	1	1	1	1	1	1	1
Total Rated Horsepower	160	3040	1400	1720	760	760	760	760	760	760	760	760
Temperature of Incoming Gas, °F.	(Est)70	(Est)70	(Est)70	(Est)70	75	79	78	71	72	75	69	76
I.H.P. Power Cylinders	127.3	3226	1722	1288	895	814	858	848	867	843	927	898
I.H.P. Compressor Cylinders	76.2	2603	1553.6	1120	762	705	743	753	772	747	833	800
Net Gas Delivered per 24 hrs., Mcf.	.8099	123,600	24,100	23,900	15,360	15,366	15,594	13,901	12,525	13,562	.....	.....
Theoretical H.P. ref. to Adiabatic required to deliver 1,000 Mcf. per 24 hrs.	87.3	15.2	50.2	39.7	43.5	42.9	43.6	49.8	50.5	50.5	48.7	30.4
I.H.P. Power Cylinders per 1,000 Mcf. per 24 hrs.	154	25.6	70.4	53.0	57.0	51.2	53.0	59.8	67.6	60.5	61.8	39.0
I.H.P. Compressor Cylinders per 1,000 Mcf. per 24 hrs.	92	20.6	63.1	46.0	48.6	44.3	46.1	54.2	60.2	53.6	55.6	34.9
Percent of Rated Developed	47.6	85.6	85.6	85.6	100	93	98	99	101	98	110	105
Compressor Efficiency, Percent	95	73.8	79.5	86.3	89.5	96.9	94.5	92.0	83.8	94.3	87.6	87.1

from 20% to 25% represents a marked reduction in operating cost.

It can be shown that with the exhaust gases at a temperature of 1000° F., either incomplete combustion (2% or more CO), or 50% excess air will cause a preventable heat loss of 9% of the higher heating value of the fuel. This is in addition to the water vapor loss, over which the operator has practically no control. In order to secure efficient combustion in the gas engine, it is necessary to satisfy the same conditions as in a boiler or furnace. Thorough mixing of gas and air before ignition helps secure complete burning to CO_2. Minimizing excess air reduces the heat lost via the exhaust line, as does low exhaust gas temperature.

In the summer of 1931, a group of Stanford University students conducted a series of tests upon a 160 H. P. direct-connected unit, which were supplemented by a brief test made by your Committee upon a 760 H. P. unit. In both cases, the work consisted of making a number of runs, first with the engine in normal operating conditions, and then with timing, load, or cooling water adjustments varied, so that the effect of each change upon the thermal efficiency could be noted.

Table 2 is an extract of the data from the Stanford test. The effect of varying adjustments to obtain the best operation is nicely brought out by the steady improvement in thermal efficiency. For instance, after the first run made, examination of the indicator cards showed that ignition was late on both sides. Since the charge of fuel started burning late, it either had to burn very rapidly to develop its heat before the end of the stroke was reached, or else an abnormally heavy charge had to be admitted. The former condition was wasteful because the mixture was too rich, and the latter because burning was not completed until after the exhaust valve opened. In the case under discussion, a gain of 2.2% in thermal efficiency was made by correcting ignition timing.

Governing on this engine was effected quantitatively by a sleeve-type throttle valve on the gas and air inlet,

Table 2—Results of Thermal Efficiency Tests on 18″ x 20″ 160 H. P. Gas Engine

	A	B	C	D	E	F	G	H	I	J
R.P.M.	187.8	191.8	195.2	197.0	194.1	195.3	195.7	195.5	195.8	195.3
B.t.u. per cu. ft. Fuel Gas	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Fuel, Mcf. per hour	1941	1930	1724	1740	1772	1676	1707	1723	1714	1754
Percent Carbon Dioxide in Exhaust Gas (Average)	Not reliable		....	....	....	....	....	....	....	....
I.H.P. Power Cylinders	172	188.5	185.8	192.1	197.5	192.0	198.8	199.3	197.5	200.7
Temperature of Exhaust Gas, °F.	1160	1200	1225	1225	1210	1180	1170	1180	1169	1178
Thermal Efficiency, Percent (Referred to Gross Heating Value of Fuel)	20.3	22.5	24.7	25.4	25.6	26.3	26.8	26.6	26.5	26.3
Thermal Efficiency, Percent (Referred to Lower Heating Value of Fuel or 977 B.t.u. per cu. ft.)	22.8	25.3	27.8	28.6	28.8	29.6	30.1	29.9	29.8	29.6

A. First 24 hr. test. All adjustments as found.
B. Valves and spark retimed. Magneto trips R.H. 37°; L.H. 40°.
C. Four port mixing valve replaced with six port.
D. 4″ dia. inlet valves replaced with 4½″ dia.
E. Inlet valve timing 20° B. T. D. C.
F. Inlet valve timing 15° B. T. D. C.
G. Inlet valve timing 10° B. T. D. C.
H. Inlet valve timing 5° B. T. D. C.
I. Inlet valve timing 0° T. D. C.
J. Inlet valve timing 5° A. T. D. C.

Table 3—Results of Thermal Efficiency Tests on 19" x 24" 760 H. P. Gas Engine

	Inlet Valve opens 35° B.T.D.C.; Exhaust Valve opens 55° B.T.D.C.; Ignition 20° B.T.D.C.	Spark Advanced 25° B.T.D.C.	Adjustments as in Test No. 1	Valves Retimed 10° later	Valves Retimed 10° earlier
R.P.M.	179	174	180	180	176
B.t.u. per cu. ft. Fuel Gas	1,190	1,190	1,190	1,190	1,190
Fuel, Mcf. per hr.	10,120	9,005	9,550	10,067	10,042
Carbon Dioxide in Exhaust Gas (Average), percent	....	4.9	5.2	5.9	4.8
I.H.P. Power Cylinders	895	813.9	858.3	867.3	842.8
Water Temperature, Inlet, °F.	70	66	66	63	62
Water Temperature, Outlet, °F.	101	93.2	93.5	93	92
Water per hour, gallons	14,700	14,800	14,950	11,900	12,200
Total Heat in Fuel, B.t.u. per hour	12,042,800	10,715,950	11,364,500	11,979,730	11,949,980
Heat to Useful Work, B.t.u. per hour	2,277,775	2,071,376	2,184,373	2,207,278	2,129,656
Heat to Cooling Water, B.t.u. per hour	3,795,981	3,353,325	3,424,671	2,973,810	3,150,406
Heat to Exhaust, Radiation and Unaccounted for	5,969,044	5,291,249	5,755,456	6,798,642	6,669,924
Temperatures of Exhaust Gas, °F.	.....	.....	.....	.....	.....
Thermal Efficiency (Referred to Gross Heating Value of Fuel), percent	18.5	19.3	19.3	18.4	17.8
Thermal Efficiency (Referred to Lower Heating Value 1,081 B.t.u.), percent	20.4	21.6	21.2	20.2	19.6

located just ahead of the inlet valve, and operated by a spring loaded governor. During the first test run, difficulty was experienced in causing the governor to operate at full load, and its tendency to remain wide open supported the reasoning presented in the preceding paragraph.

Next, at the suggestion of the Cooper Company representative, the standard four port mixing valves were replaced with six-port valves. In operation, the total opening was no greater, but the six-port valves appeared to induce a greater turbulence in the flow, improving the co-mingling of gas and air, and producing a better-burning mixture. The result is again evident in the thermal efficiency column, producing a further gain of 2.2%.

It was then noted that the inlet valve area was somewhat smaller than the maximum port area in the mixing valve. This being the case, it seemed that some throttling must occur at the inlet valve. That condition was undesirable, as it disturbed the control over the volume of charge admitted, which was properly the function of the governor or mixing valve. By replacing the original 4" inlet valves with 4½" diameter valves, an additional 0.7% was gained. It should be especially noted that the indicated horsepower developed was increased by each of the foregoing changes, which, in effect, meant an increase in the *capacity* of the machine, as well as an improvement in economy.

After determining the most efficient ignition timing and mixture, a series of runs was made to find the best valve setting. On these engines the inlet cam, exhaust cam, and camshaft are made up in a single forging, so the position of the two cams is fixed with respect to each other. They can be adjusted, however, with respect to piston position, and the setting is quite important.

Using the inlet valve opening as the index event, runs were made with settings at 20°, 15°, 10°, 5° and 0° before top dead center; and 5° after top dead center. For the old style "quick opening" cams, best operation occurred with the opening commencing at 10° early. With the newer style cam, having a "quieting" curve at the base, the best setting appeared to be for the inlet valve opening to start at top dead center.

One of the important points brought out in this study was the effect of timing and mixture upon the shape of the indicator card. With correct timing and mixture, a full, well-rounded card is obtained without the objectionable "peak," or high initial pressure, that places excessive strain on bearings and frames. On the other hand, either a too lean or too rich mixture may be made to produce an excellent card by advancing the spark. The reason for this, as brought out by the Stanford test and reported in "Power" (Vol. 75, No. 17 p. 618) is that either a too rich or too lean mixture burns more slowly than the correct mixture, and must therefore, be ignited earlier. It therefore is evident that the engine indicator alone does not tell the whole story of gas engine performance. To insure economical operation, an indicator, flue gas analyzer, and exhaust gas pyrometer are needed, because each engine must be adjusted to suit the requirements of its particular fuel.

Table 3 covers the tests made by your Committee upon a 760 H. P. direct-connected unit. Each run was of one hour duration, readings being taken every 15 minutes, and averaged, or totalled, as required. The effects of the various adjustments are reflected in the thermal efficiency column. Apparently the valve timing was correct for the fuel being used, since both advancing and retarding the setting lowered the efficiency.

The low CO_2 readings indicated that either combustion was incomplete, or that a large excess was present, or both. The same difficulty was experienced in making the Orsat readings balance, but it was evident that less than 1% CO was present. This being established, it followed that between 60% and 100% excess air was being admitted to the power cylinders.

In order to correct this condition, the mixture was readjusted, but it was found that an excessively high terminal pressure was caused by a comparatively slight enrichment. The next step was to retard the spark slightly to reduce the initial pressure, and then again increase the proportion of fuel. Unfortunately, lack of time prevented further experiments along this line, but subsequent tests on similar units have indicated that this procedure would eventually result in improved efficiency.

Sample Calculations

$$P_2/P_1 \text{ (Compression Ratio)} = \frac{\text{Abs. Discharge Pressure}}{\text{Abs. Intake Pressure}}$$

$$= \frac{106 + 14.7}{8.1 + 14.7} = 5.3$$

Table 1—Horsepower Tests, Run No. 2:

Theoretical H.P., referred to Adiabatic, required to deliver 1,000 Mcf., per 24 hours =
From table, p. 350, vol. 22, Proceedings P. C. G. A., for compression ratio of 5.3, Adiabatic H.P. = 87.3

I.H.P. Power Cylinders per 1,000 Mcf., per 24 hours, with Intake Gas Temperature of 60° F. =

$$\frac{\text{Total I.H.P. of Power Cylinders}}{\text{Total Mcf. per 24 hours}} = \frac{127.3}{.8099} = 157 \text{ H.P.}$$

Corrected for actual intake temperature of 70°:

$$157 \times \frac{460° + 60°}{460° + 70°} = 154 \text{ H.P.}$$

I.H.P. Compressor Cylinders per 1,000 Mcf., per 24 hours, corrected to Intake Temperature of 70° =

$$\frac{\text{Total I.H.P. of Compressor Cylinders}}{\text{Total Mcf., per 24 hours}} \times \frac{460° + 60°}{460° + 70°} =$$

$$\frac{76.2}{.8099} \times \frac{460° + 60°}{460° + 70°} = 92 \text{ H.P.}$$

Percent of Rated Load Developed =

$$\frac{\text{Compressor I.H.P.}}{\text{Rated H.P.}} = \frac{76.2}{160} = 47.6\%$$

Note: In runs No. 4 and No. 5, the low and high sides were added together.

Compressor Efficiency =

$$\frac{\text{Theoretical H.P. required to deliver 1,000 Mcf. per 24 hours}}{\text{Compressor I.H.P. required to deliver 1,000 Mcf. per 24 hours}} =$$

$$\frac{87.3}{92} = 95\%$$

Table 2—Thermal Efficiency Tests, Run No. 1:

Thermal Efficiency referred to Gross Heating Value of Fuel =

$$\frac{\text{B.t.u. converted to Power Cylinder I.H.P. per hour}}{\text{B.t.u. in fuel gas per hour, gross or higher heating value}} =$$

$$\frac{2545 \times 172}{1100 \times 1941} = 20.3\%$$

Thermal Efficiency referred to Lower Heating Value of Fuel =

$$\frac{\text{B.t.u. converted to Power Cylinder I.H.P. per hour}}{\text{B.t.u. in fuel gas per hour, lower heating value}} =$$

$$\frac{2545 \times 172}{977 \times 1941} = 22.8\%$$

Table 3—Thermal Efficiency Tests, Run No. 1:

Total Heat in Fuel, B.t.u. per hour =
Mcf. fuel per hour × B.t.u. per cu. ft. × 1,000 =
10.120 × 1190 × 1000 = 12,042,800 B.t.u. per hour.

Heat to Useful Work, B.t.u. per hour =
I.H.P. Power Cylinder × 2545 =
895 × 2545 = 2,277,775 B.t.u. per hour.

Heat to Cooling Water =
Gallons water per hour × 8.33 × (Water temp. out—water temp. in) =
14,700 × 8.33 × (101°—70°) = 3,795,981 B.t.u. per hour.

Heat to Exhaust, Radiation, and Unaccounted for:
By difference, = Total heat — (Heat to Useful Work + Heat to Cooling Water) =
12,042,800 — (2,277,775 + 3,795,981) = 5,969,044 B.t.u. per hour.

Housing Conference Report Condemns High Building Costs

DECLARING that the American public pays too much for housing that is poor in design, construction, and equipment, a group of nationally known architects, builders, dealers in building materials and equipment, engineers, and home economists offer detailed plans for the correction of this situation in the fifth volume of the final reports of the President's Conference on Home Building and Home Ownership, which is published today. The recommendations of these building authorities form part of the complete program to raise the standard of American housing that was formulated by the President's Conference at its meeting in Washington last December.

The four parts of this program that have already appeared in book form show what improvements in housing and reductions in costs can be made through city planning and zoning, subdivision layout, home financing and taxation, large-scale operations, and household management. But as the introduction to this volume states, no matter what other economies may be effected, construction costs must be cut before "new houses of high standards can be brought within the reach of the wage-earning group of our population."

The essence of the proposed plan to lower costs is better organization of the building industry. The authors find the failure of architects to work with builders, the failure of both these groups to work with subdividers, or manufacturers of materials and equipment, or home economists, or research men, or any of the hundred other groups whose activities combine to produce modern housing is at the bottom of the poor quality and high cost of home building. "If automobiles had been built in the past with the same lack of coordinated effort which is still typical of some home building operations, the automobile industry would long ago have had to confine itself to the limits of a luxury product or abandon its efforts." The appeal for cooperation runs like a refrain through the chapters of the volume.

Gas appliances and equipment receive important consideration in this volume.

The four volumes of the President's Conference reports that have already appeared are: Planning for Residential Districts; Home Finance and Taxation; Slums, Large-Scale Housing and Decentralization; and Household Management and Kitchens. Six more volumes are to appear in the next few months, making a total of eleven. The volumes can be purchased for $1.15 each postpaid, from Dr. John M. Gries, Executive Secretary, President's Conference on Home Building and Home Ownership, Department of Commerce Building, Washington, D. C.

Diversified Uses of Gas by Baltimore Industries

Industries	Number of Customer Locations	Connected Load—Cu. Ft. per Hour
Auto Repair	33	17,850
Bakeries	228	171,955
Can Manufacturers	8	43,020
Ceramic Works	27	43,575
Chemical Plants	61	98,715
Clothing Manufacturers	118	88,805
Coffee Roasting	15	35,430
Clubs	39	38,355
Confectioners	48	38,560
Electrical Manufacturers	13	12,150
Hotels	25	29,235
Hospitals	37	45,345
Institutions	97	88,805
Meat Packers	32	26,245
Metal Working Industries	181	265,700
Miscellaneous Food Mfrs.	54	31,695
Miscellaneous Manufacturers	70	31,110
Paper Industry	10	5,595
Printing Establishments	63	43,665
Public Buildings	98	76,650
Restaurants	369	218,760
Stores—Department, etc.	36	20,530
Tin Decorating Companies	4	49,835
Wood Working Establishments	27	15,795
Total	1,693	1,537,380

A Simple Process For the Disposal of Ammonia Liquor

D. V. MOSES AND B. H. MACKEY

Ammonia Department,
E. I. du Pont de Nemours & Co., Inc.,
Wilmington, Delaware

THE disposal of coke oven wastes having a comparatively high phenol content is a problem which has attracted considerable attention because of its influence on public water supplies. Phenol contamination, even at the extremely low concentration of one part per billion, imparts a disagreeable taste to water chlorinated for domestic use. Authorities charged with the control of stream pollution are at all times alert to prevent discharge of untreated phenolic wastes into public water supplies.

During the past two years, the by-product ammonia liquor from the coke ovens at the Belle, West Virginia, Works of the E. I. du Pont de Nemours and Company, has been disposed of in the coke quenching process either by its addition to the quenching water or by its use in undiluted form as a preliminary quench preceding the main quench. Both systems were found to lead to difficulties in increased corrosion of the quenching car and absorbed compounds in the coke that aggravated corrosive conditions in gas making. Consideration was given to other methods of ammonia liquor treatment in common use, but it was found that a considerable investment in new equipment would be required and added complication and expense of operations would result. Since recovery of by-product ammonia is not economical as compared with synthetic production and since the phenol recovery at market value will not pay operating expenses, it was decided to investigate methods of treatment that would permit wasting these materials and would, as far as possible, fit available equipment. A simple distillation method based on ordinary analytical methods for phenol was evolved and this is described below.

Preliminary Experimental Work

An analysis of the ammonia liquor before treatment showed approximately 5 grams per liter of phenolic constituents, 5 grams of free ammonia, 11 grams total ammonia, and 11 grams of chloride. Cyanogen, sulfides, and sulfates totalled approximately one-half gram per liter.

A number of distillations of the liquor were made in ordinary distilling flasks and an efficiency of phenol removal of 98% noted. The concentration of phenol in the vapor was found by analysis of the various fractions to be approximately twice that of the contact liquid. A check distillation of a phenol-water mixture having a concentration of 5.5 grams per liter gave results almost identical with those obtained with ammonia liquor. The effect of added ammonia upon the volatility of phenol was studied and it was found that the addition of large quantities of ammonia during distillation tended to retard the removal of phenol while small quantities had little or no effect. The addition of carbon dioxide during distillation had no noticeable influence on phenol removal.

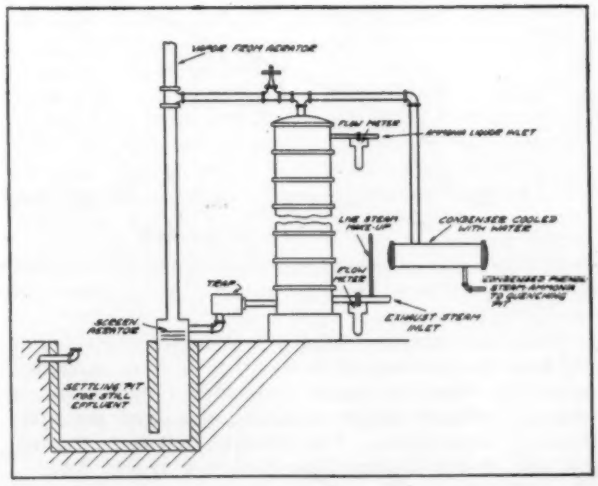


Fig. 1—General Arrangement of Equipment

In order to determine the possibility of volatilization of ammonium chloride (to which substance most of the corrosive tendencies previously mentioned are attributed), a 5% solution of ammonium chloride in water was distilled to one-half its volume and the distillate tested qualitatively. No chloride was found and it was therefore concluded that the non-corrosive, taste-forming materials (phenols, cresols, etc.) could be separated from the corrosive ammonium chloride to an extent which would permit the latter to be wasted to the river. Steam distillation experiments were conducted on a full scale with available plant equipment.

Equipment and Operating Conditions

A 27-plate regeneration column 5'2-½" inside diameter each plate having 62 bells of 5" outside diameter was equipped with standard orifice type flow-meters on the liquor inlet to the top tray and the exhaust steam inlet below the bottom tray (see Fig. 1). During experimental operation, the vapors were wasted to the atmosphere through a vent pipe.

The theoretical steam requirement was calculated from the vapor concentration noted in the laboratory, the steam required to heat the liquor from atmospheric temperature to boiling and that required to compensate for radiation losses as measured by operation of the column without liquor flow. Dilution from condensate was included at the value indicated by the vapor concentration. The total requirement was calculated to be approximately 80% of the weight of entering liquor.

Operation of the column was started with the above steam requirement and a flow of 250 gallons per hour of tar-free liquor. The phenol content of the effluent was found to vary from 15 to 38 parts per million. The steam flow was reduced without loss of efficiency to 59% of the liquor weight plus a constant quantity of 600 lbs. per hour to care for radiation losses. Below this value, the concentration of phenol in the effluent

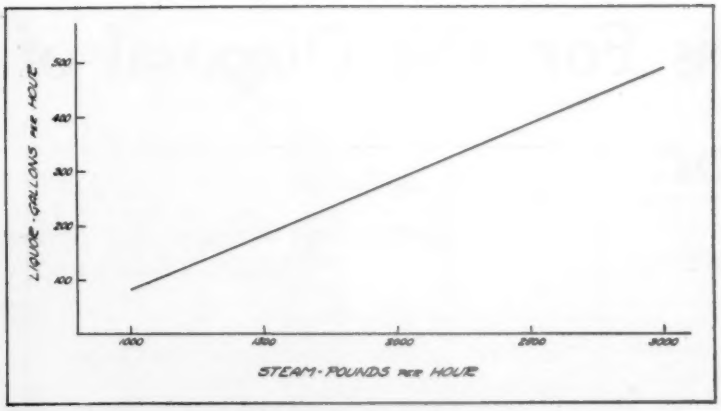


Fig. 2—Steam Requirements for Various Liquor Flows

was found to increase sharply. A further reduction could have been obtained by the use of heat exchange between the entering liquor and effluent, but with an excess of exhaust steam available, this was not considered of importance. The relation between entering liquor and required steam flow is shown in Fig. 2.

During 43 days operation at a liquor flow of 250 gallons per hour and a steam flow of 1900 lbs. per hour (using low-pressure exhaust steam), the average phenol content of the effluent was 31 parts per million with a single maximum of 113 parts per million. The concentration of phenol in the entering liquor was 5 grams per liter (equal to 5000 parts per million). When corrected for the 30% increase in volume of liquor treated due to condensation, the average phenol removal was 99.2%. At the end of the above period, the column, which is of cast iron construction throughout, was opened and found undamaged by corrosion.

Phenol Distribution and Disposal of Vapor

In order to ascertain the amount of phenol remaining in the column at various points, a series of samples were taken from various trays during operation and the phenol determined. The results shown graphically in Fig. 3 indicate that the number of trays is in excess of that required. The phenol removal is nearly identical with that of free ammonia and the capacity is indicated as similar to that of a still removing free ammonia.

During experimental operation the still vapors were vented to the atmosphere, and it might be claimed that because of localized condensation, the immediate surroundings would become saturated and phenol returned to the river. Consideration was given to the possibility of wasting the vapors with stack gases and to condensation and return to the quenching pit. Because of the length of line between the column location and the stack and the difficulty of revaporizing any condensate formed in the line, it was decided to condense the vapors in a condenser having aluminum tubes and a cast iron shell as shown in Fig. 1 and to use the condensate for coke quenching. Qualitative tests for chlorides made on the condensed vapors have confirmed laboratory experiments indicating the absence of carryover. Since the coke is not intended for domestic consumption, difficulty from unpleasant odors due to the absorbed phenol from the quenching water is not expected.

Disposal of Still Effluent

The effluent from the still is ordinarily a clear yellow to light red color but darkens rapidly upon exposure to air. A small amount of solid material is precipitated and can be separated by settling. The simple aerator consisting of four screens over which the effluent passes counter-current to the flow of air and the settling chamber giving one hour retention as shown in Fig. 1, have been planned to reduce solid material carried into the river.

Control of Operation

Plant operation has been controlled by analysis of the effluent twice per shift by a rapid method and by daily laboratory analysis of a composite sample by a more exact method. The method used in the plant is a more sensitive modification of that developed by J. A. Shaw (*Ind. and Eng. Chem. Anal. Ed.*, Vol. 1, p. 118, 1929) in which a double-sized sample is used and concentrated to the volume specified after the addition of sodium hydroxide to fix the phenols. The method used in the laboratory is describe in the "Methods of the Chemists of the U. S. Steel Corporation for Sampling and Analysis of Coke and By-products." Results previously shown were obtained by the use of the latter.

Tests on Effluent

A series of tests made by official chemists under the supervision of the Ohio River Board of Engineers on samples of the effluent from the column indicated that

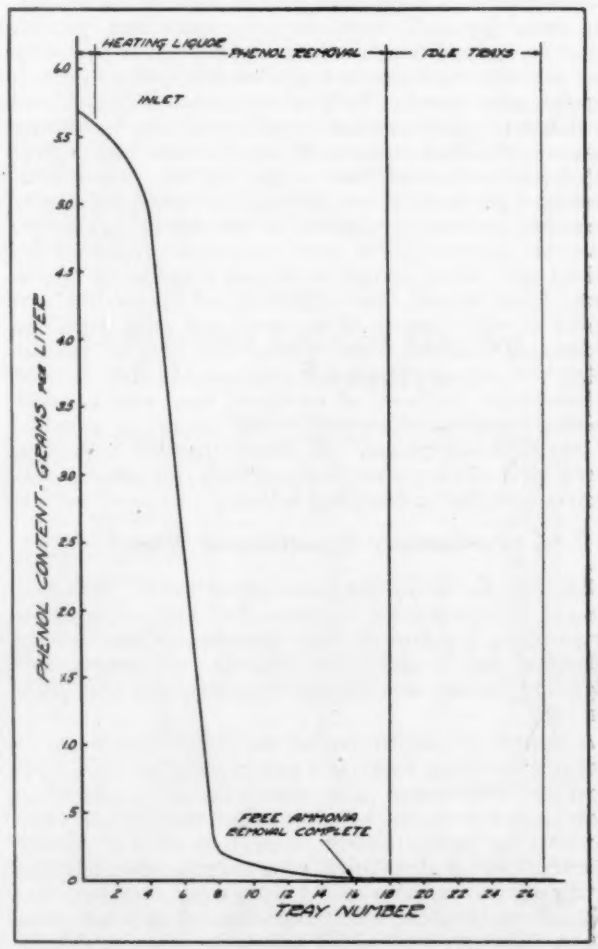


Fig. 3—Distribution of Phenol on Trays

it was of a quality superior to the waste from other processes with regard to taste-forming constituents and oxygen consumption. A test of the effect on fish life conducted at the West Virginia State Trout Nursery at Petersburg showed no harmful effects on trout at less than 1% concentration of effluent by volume. The process was therefore put in regular commercial operation.

Applicability of Process

It is believed that the process as outlined can be carried out in any ammonia still provided reasonable care is used in setting the necessary steam/liquor ratio by correlation with effluent analyses. The still capacity is dependent on many factors such as permissible back-pressure, design of trays, etc., and can best be determined experimentally. In general, the capacity should be the same as for ammonia removal. If a dephlegmator is included, it should be disconnected or by-passed, as the refluxing will return phenols to the still. The method of vapor disposal, whether by stack dilution or condensation, is dependent upon local conditions and the intended use of the coke.

Sugar Refinery Effects Substantial Savings By Installing Gas Burners

BRANDON B. WOOLLEY

REPLACEMENT of crude oil with natural gas as a boiler fuel in the Henderson Sugar refinery in New Orleans has resulted in a saving of $9 a day for labor from the date the gas installation was recently finished, according to Chris J. Gambel, general manager.

Gibson patent low-pressure burners with Merit automatic controls were put in at an over-all cost of $3,927.69, replacing oil burners and making gas the sole fuel used in both the charhouse of the plant and in the refinery proper.

The plant is one of the two large refineries in New Orleans. It is housed in two buildings—one the charhouse, where seven large gas-fired kilns reduce the raw material to the boneblack that is used to "whiten" sugar, and the other the refinery proper, where the process of producing granulated white sugar is completed.

Pulverized Coal and Oil Previously Used

The use of gas in the plant began more than a year ago when New Orleans Public Service, Inc., installed at their own expense Forney high-pressure gas burners and contracted to supply gas on an industrial rating. The management previously had had experience with pulverized coal fed with automatic stokers and was at that time using crude oil in the boiler house of the refinery building, where the steam demand is heaviest.

The satisfactory performance of these gas burners was the opening wedge.

When a representative of the Webster Engineering company of Tulsa, Oklahoma, called about seven months ago and offered to install a Gibson low-pressure burner in the charhouse on trial, his proposition was accepted. A No. 708 Gibson patent regenerative burner was installed under one of the kilns. Since a constant flow of gas was available from the public mains the need for the type of automatic control used later in the boilerhouse of the refinery building was not present. The trial satisfied Mr. Gambel and he ordered burners for the refinery building boilerhouse. Installation began early in March and was finished about the middle of the month.

There are 720 horsepower Babcock and Wilcox water-tube boilers and one 550-HP. B. and W. of the same type, all delivering a constant steam pressure of 145 pounds. Eight oil burners, each rated at 120 HP., had been installed in each of the three boilers. In addition to the three water tenders, working 24 hours in shifts of eight hours each, there were employed for each boiler as well three firemen, likewise working in shifts. The latter were receiving $3 a day each on the New Orleans pay scale, a total of $9 for the 24 hours.

The oil burners were removed. In their place 10 Gibson No. 798's were installed under the two 720-H.P. boilers and three Gibson No. 707's were put in under the 550-HP. Installation was rapid after the pipe work was finished. Coupled with the installation was the Merit system of automatic gas control, one unit being connected with the gas feed of each boiler and all controlled by a master control regulated with steam from one of the boilers.

The installation cost was divided thus: burners—$2118.75; Merit control system—$750; material—$629, and labor—$429. The total came to $3927.69.

The oil burners were stored for auxiliary use and the equipment necessary for their use kept in place for the same purpose.

A three-day test for April 12, 13, and 14, showed the gas consumption in the boilerhouse to be 2,150,000 cubic feet delivering about 2,150,000,000 B. T. U.'s per 24 hours.

A comparative three-day period with the oil burners showed a consumption of 350 barrels of "Bunker C" crude oil which delivered approximately the same number of B. T. U.'s.

A more or less exact estimate on the comparative performances of the two types of burners with their respective fuels could not be given at present, Mr. Gambel stated, because of the intermittent nature of refinery operations. Operating under full load, he explained, the plant went ahead under maximum efficiency, while operations at less than full resulted in an accompanying loss of efficiency. The difficulty in estimating performances is further complicated by the fact that thus far since the gas installations a full month of gas alone can not be compared with a full month of oil alone because operating conditions have not remained constant.

Gas Very Satisfactory

"We are well satisfied with the gas installation, however," Mr. Gambel said. "The fact that the cost of firing labor in the boilerhouse has been eliminated is very gratifying. A rough comparison of the efficiency of crude oil and gas as boiler fuels shows them to be about equal except for the fact that gas is under more complete control. This gives an advantage to the use of gas."

If business conditions justify it, he added, Gibson burners will be installed later in the kilns of the charhouse.

He said the saving in labor through use of the Gibson burners with the automatic system would result in a clear saving this year of $1350, figuring on a basis of 150 days of operation.

The plant is getting gas from New Orleans Public Service, Inc., under a three-year contract and as an industrial user has a first rate based on probable consumption.

Ten Years of Gas Purification

A presentation of the subject from the operator's point of view—based on records and data obtained at the Lowell plant.

R. C. DOWNING

Supt. of Mfr., Lowell Gas Light Company,
Lowell, Mass.

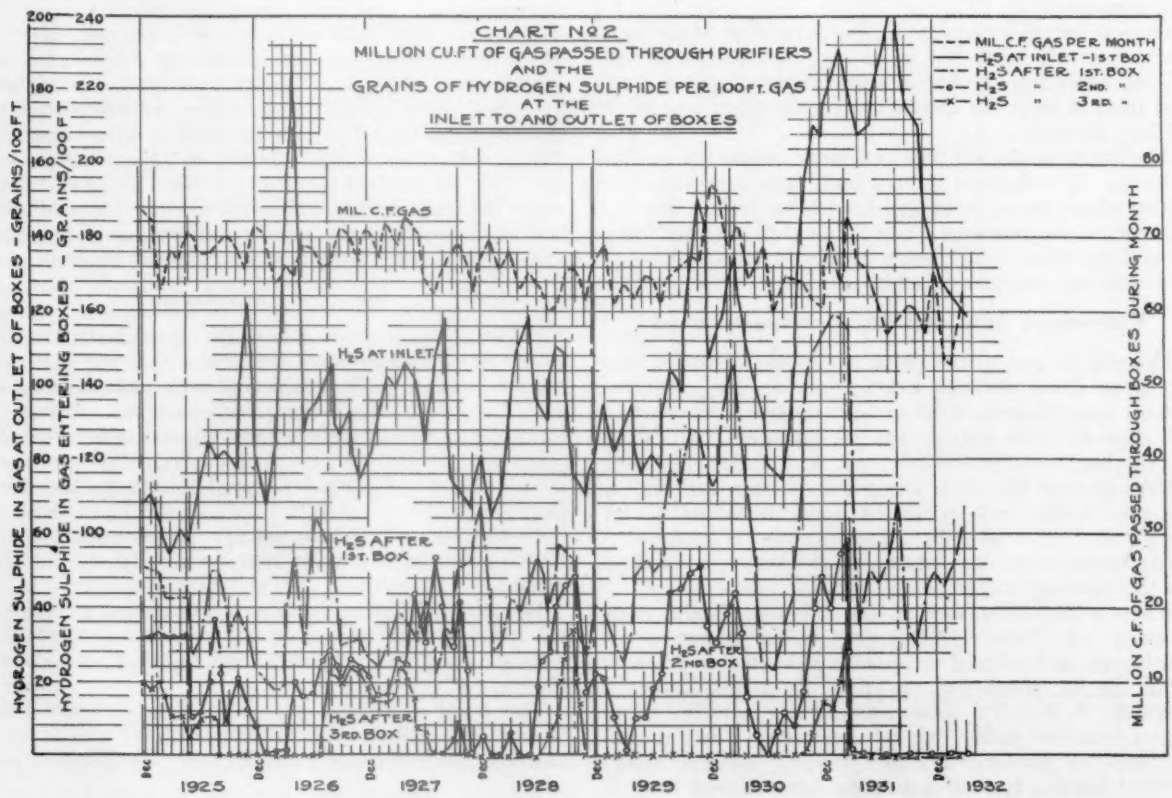
(Continued from July issue)

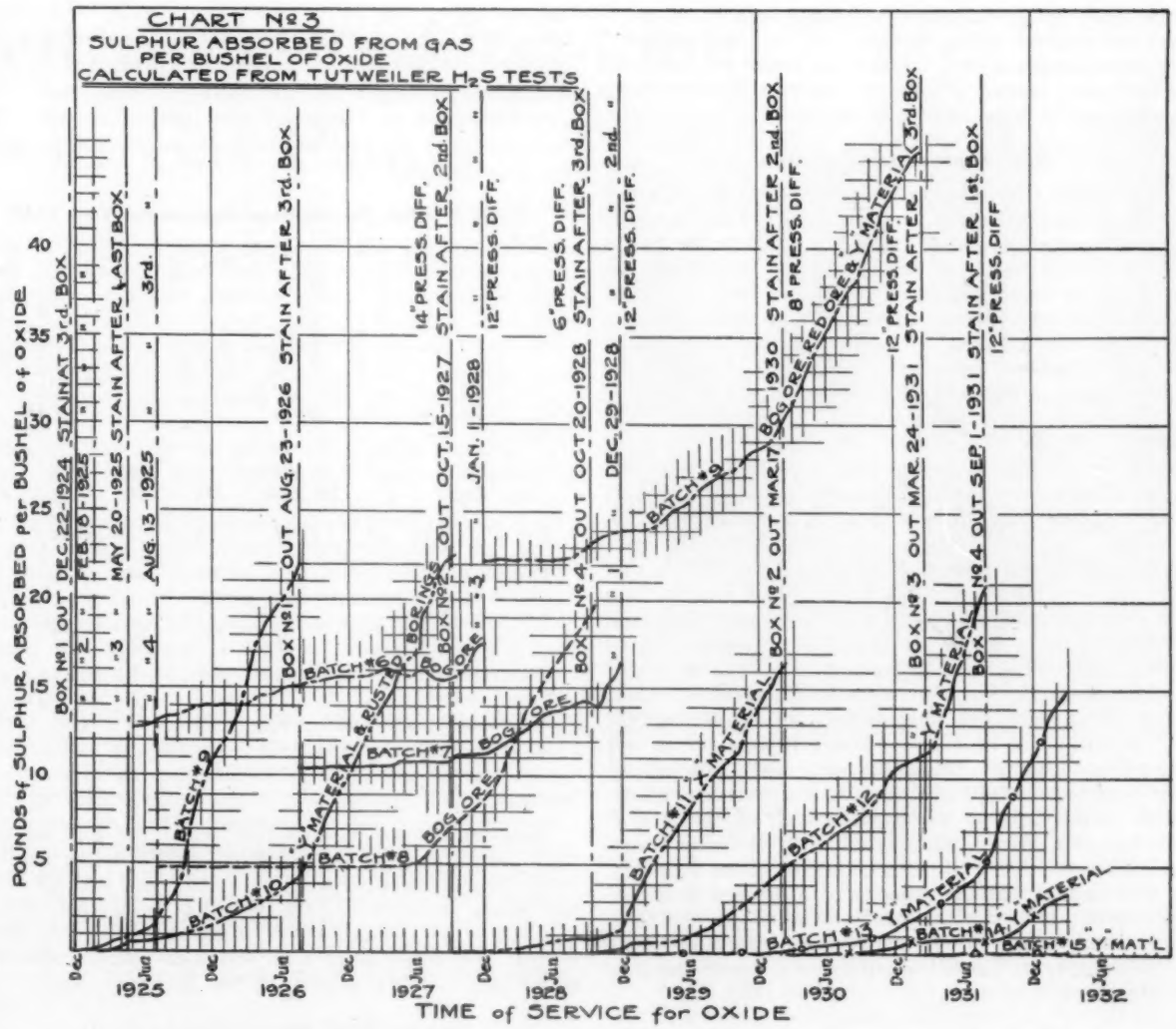
Value of Regular Plant Sulphur Records

IT has often been recommended that regular daily plant records of hydrogen sulphide be kept to serve as a basis for calculating sulphur absorption by multiplying by the daily make. This may be very good for a plant making one kind of gas and pumping it through purifying boxes but nothing short of a continuous record of hydrogen sulphide and a uniform flow of gas would produce reliable records.

This condition was approximated at Lowell in 1925 when sufficient relief holder capacity for water gas was provided by utilizing an old reserve holder for this purpose so that the water gas could be pumped and mixed with the coal gas at uniform rates. After this condition prevailed, a continuous weekly record of hydrogen sulphide was started. Such a record is too voluminous to reproduce, but it did provide data which is of considerable interest in connection with a study of box rotation.

The rate of absorption of various batches has been studied and presented in Charts 2 and 3 covering a period of several years, a time sufficient to completely illustrate the history of some of the batches. The curves illustrate the variation in hydrogen sulphide content of the gas at the inlet and outlet of the boxes, the effect of one batch of oxide on others and many other facts. They show that in some cases a box gives off hydrogen sulphide instead of absorbing it, especially when the oxide is saturated with sulphur. Included in this study, the percentage amount of work the batch of oxide did in each position has been calculated. In almost every case, an oxide which is fully spent will have done from 70 to 90% of its work in the first position, under the operat-





ing conditions prevailing at Lowell. (Table VI.)

The largest percentage of sulphur in the gas is also removed by the box in the first position, as shown by Table VII. The data therein also proves quite conclusively that it is not correct practice to rate purification efficiency of an oxide by the number of cubic feet of gas purified per change. This method would be satisfactory if the box removed a definite percentage of the sulphur in the gas in various consecutive positions. But instead, it is noted that from 0 to 18.2% of the sulphur is removed by the boxes in the last position, from 1 to 20% in the third, from 15 to 56% in the second and from 11 to 77% in the first position, with batches of different oxides. Undoubtedly, the rotation of old or practically spent oxides is responsible for this wide variation of sulphur absorption in various positions.

Obviously, the counter flow principle of foulest gas meeting the oxide with the highest sulphur content should be followed in purification to get the best results.

Table Number VI—Per Cent of Total Sulphur in Oxide Absorbed With Box in Various Positions

Position of Box	Batch Number 6 (4th Time)	7 (3rd Time)	8 (2nd Time)	9 (1st Time)	9 (2nd Time)	10	11	12
4	0.0	26.1	1.1	2.7	0.06	1.70	0	0
3	0.8	2.8	13.9	4.1	2.24	1.30	0.8	21.9
2	3.1	48.8	13.1	4.3	29.10	15.00	3.6	31.2
1	96.1	22.3	71.9	88.9	68.60	82.00	95.6	46.9
Total	100.0	100.0	100.0	100.0	100.00	100.00	100.0	100.0

Table Number VII—Per Cent of Hydrogen Sulphide in Gas Removed From Gas By Batches of Oxides in Various Positions with Respect to Incoming Gas

Position of Box	Batch Number 6 (4th Time)	7 (3rd Time)	8 (2nd Time)	9 (1st Time)	9 (2nd Time)	10	11	12
4	0	11.1	0.7	18.2	0.8	10.1	0	0
3	1.1	8.1	8.9	20.2	15.0	7.2	0.8	20.0
2	15.1	30.8	56.3	20.6	22.9	14.5	15.0	29.9
1	57.2	70.1	67.5	74.5	58.7	11.1	57.2	77.6
Total	32.0	21.6	22.7	57.2	30.2	40.7	32.0	35.0

The time honored system of box rotation as practiced by the industry deviates from this principle when a batch of revivified oxide which has served more than 90% of its life is placed last in the series and allowed to rotate into first position as boxes are changed.

Another practice which was investigated was that of placing the foul box last in series expecting it to be revivified by the excess of oxygen present. It was found that a box operated in this manner gave off a very slight stain and tested five grains of H_2S at the box outlet for several months. This sulphur was evidently absorbed

by the water in the station meter until it became saturated when the sulphide stain appeared in the street gas and the practice was stopped. There are many advocates of this backward system of rotation but very little evidence was obtained of it being of any value.

New System of Rotation

As a result of this study of rotation systems, a change was considered advisable. In January, 1930, an inside flue was installed in one of the boxes to allow the gas to enter at the top instead of the center and to leave at the bottom. The trays and steel work were removed from the boxes as each change of oxide was made. In the future, an entire batch of oxide will not have to be removed to relieve excessive back pressure caused by the sulphiding of layers in the center of the box. The top layer alone, of from, say, one to two feet will be removed. If the efficiency test indicates that the oxide removed has served a useful life, it will be discarded. If not, it will be returned to the same box when the next change is made, which will also be because of slack pressure.

When all the old oxide is fully spent by service in this box in the first position, it will be discarded and the box filled with new oxide to serve as a catch box in the last position. This system is expected to be productive of further reduction in purification costs. Not only will all waste of good oxide be stopped as a result of eliminating the divided gas flow system but investment in oxide material will be reduced about 40%, since it will be possible to purify efficiently with three batches of oxide in service instead of five as at the present. Maintenance of one-half of the trays and all of the steel I beam supports is also eliminated with the downward flow. This steel has a life expectancy of about 30 years. It is well known that the capacity of a divided flow box when regular reversals are made is much greater than with a straight single flow system but the enormous purification capacity at Lowell is sufficient to overcome any such objection.

Effect of Scrubber System

In the introduction to this paper, it was stated that the effect of condensing equipment and scrubber standpipes on sulphur removal from coal gas would be discussed. This is a complicated study, as it involves a knowledge of the hydrogen sulphide in the crude coal gas which varies not only with the sulphur content of the coal but with the manner in which sulphur is combined in coal.

Perhaps the best means of arriving at a conclusion relative to this subject is to draw up a sulphur balance over a sufficiently long period. During the year 1930, no water gas was made. The weekly purifying box records indicated that 169,419 pounds of sulphur were absorbed; 791,394,000 cubic feet of gas passed through the boxes. This gas was made from 61,636 tons of coal containing .66% sulphur, or 407 tons. The coke and breeze produced from this coal amounted to 43,672 tons with an average sulphur content of .57%. Therefore, 250 tons of sulphur were eliminated with the coke, the balance going into the tar and gas. The 705,408 gallons of tar produced weighed ten pounds per gallon and contained .37% sulphur by weight, or 13 tons of sulphur. The average sulphur in the clean gas delivered to the city amounted to 9.0 grains per 100 cubic feet. This data enables a sulphur balance to be established as shown in Table Number IX.

Table Number IX—Sulphur Balance for Year 1930

	Per Cent by Weight of S	Annual MCF, Tons Used or Produced	Grains S per 100 Cu. Ft. Gas	Tons of Sulphur	Per Cent Sulphur Distribution	
Coal Carbonized	.66	61,636	...	407	100	
Products						
Coke and Breeze	.57	43,672	...	250	61.4	
Crude Gas....	...	791,394M	278	157	38.6	100
Tar	.37	3,527	40	13	3.2	
Tar Free Gas	...	.....	238	144	0	
S Absorbed by Oxide	...	.....	149	84.7	20.8	
S Left in Clean Gas...	...	791,394M	9	5.3	1.3	
S In Condensate & Liquor	...	.....	80	54.0	13.3	38.6
			238	144.0		

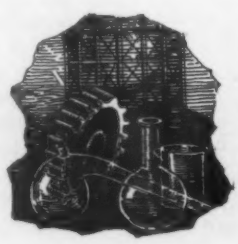
It is interesting to note that when the low sulphur coals were used, the tar absorbed 14.28% of the sulphur from the gas, the ammonia liquor combined with 28.73%, the boxes removed 53.75% and 3.24% of the sulphur was left in the gas as total or organic sulphur. In other words, the condensing and scrubber system removed about half as much sulphur as the purifying boxes.

Results With High Sulphur Coals

When high sulphur coals were used in the immediate post war years, current plant tests indicated that the scrubber standpipe system was much more effective in removing sulphur and approximately as much work was done by the scrubber standpipe as by the boxes.

Referring again to our first table (page 15, June issue), there are columns which show the type of coal used before and after the change from dry to scrubber standpipes in 1922 to be practically the same and yet the hydrogen sulphide in the coal gas before the boxes was 420 in 1922 without scrubber standpipes, as compared with 140 for 1923 during which year the scrubber standpipes were in operation. Another test showed that the sulphur drop through the primary condenser to the purifiers was about 70 grains. The scrubber standpipes removed 210 grains which is probably about one-half of the sulphide content of the crude gas.

(Continued in September issue)



Betterment of Operation in Gas Plants

HISTORY repeats itself and the present period of stress and strain, for a normal flow of business in all its phases, is no exception to similar periods of the past. Progressive institutions with investments made in plants varying in class and capacity must face their past performances and programs by making a complete analysis of the experience gained through such performances with the view of not repeating the same errors or the then made decisions of letting betterment take second place for enlargement and capacity.

A more sane and rational method would be to start preparation for the return to normalcy *now* and thus help improve conditions by preparing and carrying out betterment projects that will reduce the past operating costs. Betterment of operation should therefore be the keynote of development work as it assuredly will do most to bring about the economies necessary for our industrial success.

By-Product coke plants are, like other industries, faced with the past—high—values—keeping—operating—costs—high and therefore economy of operation must be striven for before satisfactory improvement can be secured. The past decade has seen within industry a tremendous expansion with relatively little thought toward economy and the next decade will undoubtedly be the reverse. The by-product coke industry has gone through this expansion period and should now not only try to reduce operating costs, but at the same time eliminate wasteful and nuisance-causing methods.

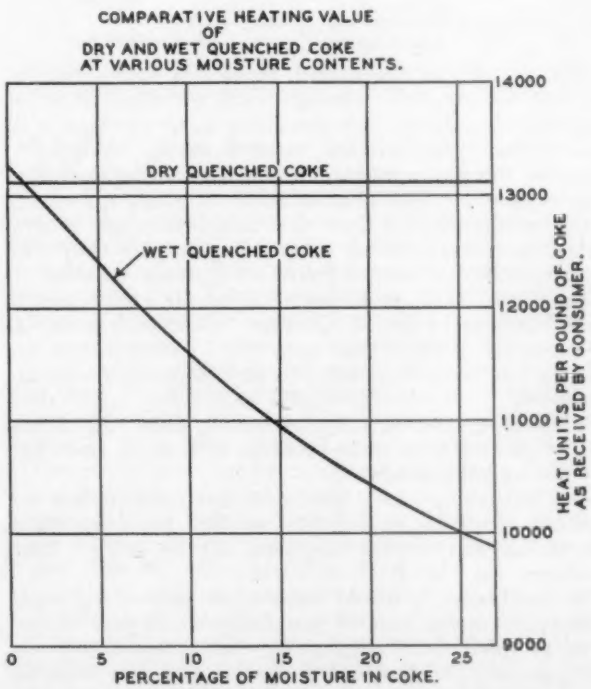


Chart No. 1.

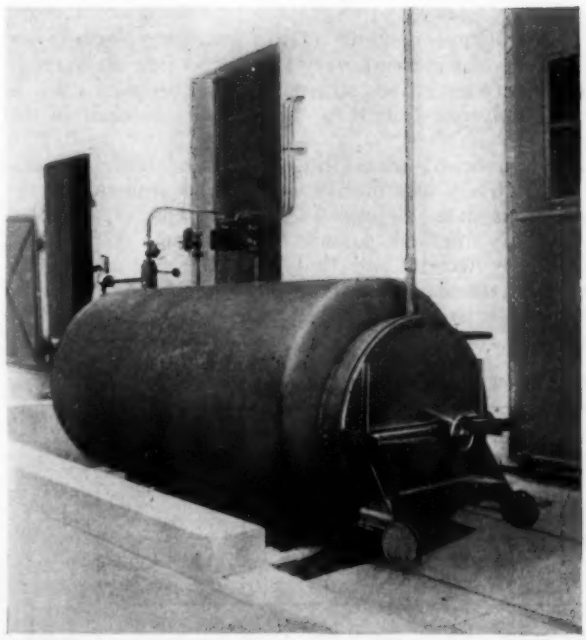


Fig. 1—Dry Quenching Installation at a Town Gas Plant that produces only 9300 pounds of Coke per day. This plant produces steam at 75 pounds gage pressure. There are two of such units in this plant.

Everyone is familiar with the dense, destructive, vapor-laden clouds that arise every time a load of hot coke is wet quenched and now this is such an unnecessary waste, that its elimination must arouse the interest of all thinking executives. In the wet quenching, or cooling, of coke, there is not only wasted all the sensible heat but also caused the destruction of surrounding plant structure, to say nothing of the expense of water used in wet quenching.

The thermal shock due to wet quenching causes coke so cooled to have many cross fractures, at the same time causing the ultimate consumer to pay a high price for the excess moisture that always accompanies such wet quenched coke. For domestic use the wet quenched coke causes a loss to the householder by drying out and making an objectional dust nuisance in the house. The objectionable nuisance of wet quenching can now be eliminated profitably, both to the manufacturer and to the consumer, by the installation of a Dry Quenching system.

Coke cooled by the Dry Quenching method and system without the presence of water is therefore, a produced coke free from excess moisture and is stronger, cleaner and free from black spots or incomplete distillation, even though incomplete in this respect after leaving the coke ovens.

Experience has proven that coke consumers prefer to use Dry Quenched Coke for the reason that the coke so cooled is a better grade of fuel free from dust, moisture and has higher heat value.

Dry Quenched Coke is stronger, contains less cross fracture and is always clean, no dark spots or incompletely distilled pieces—as the dry quenching process completes the distillation of any pieces not fully oven-coked. It can be safely stated that all consumers who

have used dry quenched coke object to being supplied with wet coke.

Dry quenched coke contains more actual heat units, as received by the consumer, than wet quenched as is shown in Chart No. 1.

The moisture content of the smaller sizes of wet quenched coke increase very rapidly so that an average overall-sizes-moisture-content in wet quenched coke is usually only one-fourth of the moisture content in the breeze.

Dry Quenched coke being devoid of moisture, absorbs relatively less moisture from the atmosphere regardless of size. Repeated tests show that coke cooled by the dry method permits more actual coke to be shipped by weight and that less moisture absorption occurs in transit than coke which has been cooled by the usual wet quenching method.

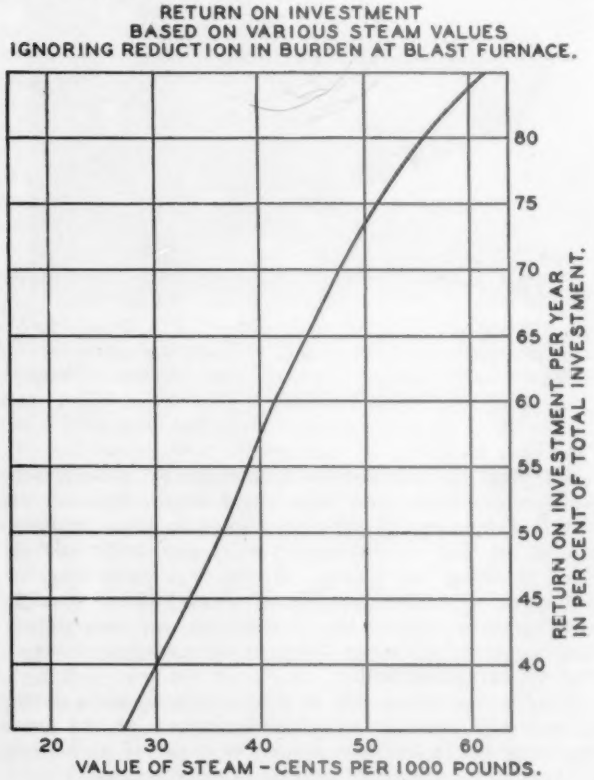


Chart No. 2

In burning wet quenched coke a certain amount of the coke is needlessly wasted in driving off the moisture. This loss is usually about one per cent more than the moisture content. Dry quenched coke breeze is therefore a more desirable fuel for use under boilers as the saving in actual fuel due to lack of moisture amounts frequently to 15%. The waste from this cause alone in the production of coke in 1930 amounted to over 700,000 net tons, or, if this had been used in the production of electric power through use of Dry Quenched coke breeze, there would have been gained the further output of over 750 million kilowatts of electric current free of all fuel cost.

Dry quenched coke fines being devoid of moisture are being successfully used in gas producers for heating the coke ovens, supplanting higher priced, better saleable sized coke, or bituminous coal. Actual fuel reduction amounts to approximately 8 per cent. In addition, somewhat smaller sizes can be used, in fact, the Dry Quenched Coke through ⅞ inch over $\frac{3}{16}$ inch mesh screen is even more satisfactory than wet quenched coke through 1 inch and over ⅜ inch.

The use of dry quenched coke for water gas sets shows a saving of approximately 4 per cent in fuel used.

Dry quenched coke does not clinker and ball up on the grates.

Coke size is a very important item to the coke manufacturer and for domestic suppliers the dry quenched coke as put in stock bins is practically the same in size as wet quenched.

When coke for domestic use is treated with a dust laying solution the dry quenched coke is far superior as it contains, after spraying, less total moisture than can be carried so that it is always safely dry while the wet quenched coke when sprayed contains approximately twice as much moisture as can be carried. with the natural result that fumes are given off in the consumer's bins with consequent damage to the surroundings.

In addition to the advantages mentioned, dry quenching recovers heat from the coke and produces approximately 1,000 lb. of steam calculated from and at 212 deg. fahr. but delivered at the required pressure and temperature. This frequently may be all the steam needed in the by-product coke plant.

At the plant of Rochester Gas and Electric Company, Rochester, New York, the following operating results are being secured:—

Capacity of Dry Quencher plant, per day.....	850 net tons
Steam pressure.....	140 lb. gage
Feedwater temperature.....	140 deg. fahr.
Steam produced per net ton of coke cooled, actual	949.5 lb.
Steam produced per net ton of coke cooled from and at 212 deg. fahr.....	1065 lb.

At the Consumers Power Company Gas plant, Flint, Michigan, the following results have been reported:—

Capacity of Dry Quencher plant, per day.....	335 net tons
Steam pressure.....	231 lb. gage
Steam superheat.....	110 deg. fahr.
Feedwater temperature.....	220 deg. fahr.
Steam produced per net ton of coke cooled, actual	956.05 lb.
Steam produced per net ton of coke cooled from and at 212 deg. fahr.....	1128 lb.

Return on the investment from this steam output, as well as the direct savings such as: elimination of expense of pumping wet quenching water; reduction in maintenance cost of hot coke handling equipment; ignoring the many intangible benefits and indirect savings secured, make the installation of a dry quenching plant outstandingly a most desirable betterment project today; see chart No. 2. According to this chart the return on the investment based on a steam value of 30 cents per 1,000 lb. is 40 per cent, or the entire investment returned within 2-½ years: while with steam at 50 cents per 1,000 lb. the return is 73 per cent, or requiring less than 17 months to pay back the entire investment.

The savings due to a dry quenching plant indicates a reduction in cost in some cases as high as 35 cents per net ton of coke produced.

Dry quenching plants are in successful operation for various capacities, in fact, the smallest town gas plant can be as successfully equipped as the largest coke producer, see Fig. 1.

In conclusion, it would seem to be only sound business sense on the part of gas plant owners and executives to have their engineering staffs thoroughly investigate the Dry Quenching System and give immediate consideration to such an installation now; so as to be prepared and help the return of better times.

Facing and Solving Our Public Relations Problems

R. S. McBRIDE
Consulting Editor, *American Gas Journal.*

PUBLIC PSYCHOLOGY is a queer thing. Few can anticipate even a majority of its consequences; none can anticipate them all. But today every division of the public utility business must make serious effort to anticipate the many and varied reactions of the public mind with respect to our industry's public relations.

In this election year, critics' attacks are aggravated or stimulated by unemployment conditions. All divisions of industry have undergone readjustment. Operating public utility companies have been much less tried in this fashion. They were under less severe direct economic pressure; but today, because of external factors, they are meeting newly serious tests. These tests affect our public policies, and are quite as difficult as those which were involved in the readjustment to meet natural-gas supply or the technology of gas mixing.

Let's take Mr. Average Man's view of the situation and see what he thinks of it all—and why. Then it may be that we can offset his errors of conclusion by corrective influence and lead him to a sound cooperative attitude.

In the first place, Mr. Man and his wife wish to be fair. But to be fair in fact, as well as in desire, demands knowledge of the true situation. They must reason from what they have learned—usually this is mainly daily paper news and neighborhood gossip. They have, of course, reached conclusions to correspond. They cannot be expected to have checked the "facts" presented to determine their correctness or error.

WHAT have they learned lately in the press? Let's list a few items:

1. Holding companies syphon the true profits out of operating concerns to form unearned profits of the parent enterprise. Or, at least, this is the way Mr. Man reads the news story of a general statement by a distinguished New York State official. He concludes, "The local operating company is making at my expense this excess income." Does it not *sound* logical?

2. Holding companies dominate the power field. One of them, obviously by the picture, is a most wicked concern; it refuses to cooperate in giving facts to public officials. The word "Gas" is most prominent in its name. Therefore, gas companies are most wicked. Is this not real jingo logic as it interprets the wholly different statements of the Federal Power Commission? We know the Federal Power Commission has nothing to do with gas. But Mr. Average Man does not.

3. "Local group recaptures utility from alien holders," thus reads the headline as a reorganization of Rochester Gas and Electric Company is accomplished. Notice the "recapture" and the implications in "alien." What do all readers in Rochester and elsewhere believe? You would too, if you were as little informed.

4. Within three days, in what is perhaps the most conservative daily paper of the country, the *United States Daily*, we read two headlines—very fair and very true to the stories which follow: The first says, "Alabama Orders Restrictions on Utility Dividends. Proof that management fees are reasonable also required in ruling of State Commission." The second says, "Wisconsin Orders Seven Utilities to Cease Dividends. Directed to defer payment on common stock pending inquiry on conserving companies' assets." Both stories picture administrative action to retain funds in operating companies and to withhold them from the parent corporations. What do I infer, if I am like the average reader? "Yes," I say, "the state fellows have caught them now. Perhaps we're going to get some decent prices for gas after all these years." And, frankly, can you see any good reason why such conclusion is not "logical" *under the circumstances?*

5. Almost daily for months we've read of the "inflated values" imposed by mergers of companies as the saffron press has reflected both the sordid and the candid of disclosures made by the Federal Trade Commission in Washington. And, as one usually fair and clear-thinking correspondent of Washington said, "Well, they had it coming to them. The gas and electric folks would not let the Senate make a simple inquiry itself. They bragged how they'd 'fixed' it all—they had it transferred to 'the futile and helpless Federal Trade Commission.' Even their best friend now does not dare to seem friendly." And, Mr. Gas Man, please remember this is only a *power* study. It was directed at electric utilities who fought the Muscle Shoals project. But Washington says—and honestly believes, I fear—that a gas man did this job, simply because "gas" is in the *name* of his company.

And so it goes. Paragraphs six to sixty-six could cite more cases of trouble. North Carolina demands conference on lower rates. Indiana to authorize public ownership and operation. Colorado to investigate natural gas rates. Kansas orders lower charges. Senator Couzens demands Federal control of gas and electric enterprises. There are literally scores of these headlines and featured stories in every paper. Even our best friends of the press print them—and rightly, too—because at the moment they are real news.

WHAT does it all mean? Perhaps it represents at least four separate problems. Let's see if most of the troubles and problems are not in one or more of these four fallacies:

a. Holding companies are evil things. In public opinion they suffer as they are not yet understood widely—in fact, some of them seem not to be understood by their own banker-backers, perhaps their "Promotors" would be better.

b. Public utilities are still useful and legitimate political targets—especially in hard times and election years.

c. Natural gas should be cheap because the Lord made it and all the gas man does is to peddle it at an unearned profit. Gas rates are too high, especially natural gas rates.

d. There must be some evil thing in the gas company, as it still is making money. No one else has retained his profits—why should the gas man?

To correct generally these four mistaken ideas would require super-human persuasiveness and the authority of a super-Mussolini. In fact, correction on national scale is not wholly feasible. Each problem must be met and solved in each locality as it is found. There are, however, some few principles which can guide all of us in this effort. First, about this new problem of holding companies.

THE merger of several operating utilities for joint management is often, perhaps generally, a sound economic development of American business and banking. This fact can be proven by successes of our best-managed utility enterprises. But the gas customer must see this clearly. He must know of skilled engineering service actually rendered. He must hear about those banking arrangements of really advantageous character, made possible by mere bigness. He should know who really assumes the common stock risk, that makes his bond stable in price and his preferred dividend more secure.

And he must find in his local banker, broker, and engineering friends an informed confirmation of these facts, even though these men have *no* interest in the gas company. Moreover, he must see a local man highly regarded in civic and business circles serving as local manager, *with real authority* to serve the community in which he is general manager. When he sees these things he is almost deaf to political demagogues; but without these measures of reassurance even the fair-minded citizen affords fertile soil for development of anti-corporation ideas.

Still further protection of public opinion is afforded by a simple and easily understood corporation financial structure. Mr. Citizen knows something about bonds, debentures, preferred stock, and common stock. If these securities follow each other in logical order in reasonable amount, he is not much concerned as to ownership. In fact, he takes for granted that an outside "trust" may hold and vote the common. He may even think it well to have them do it, if it is all under an open and fair plan. But he can not understand complex financial structures, nor should he be asked to do so. And when it comes to trading his bonds or preferred stock in a local enterprise, for a fancily named holding-company security, he has today rightly become a skeptic. So many such trades have proven to be means to lose all or much of his former savings.

GAS men alone can not solve this big problem. They should not try. They can, however, do their best to reestablish on the plane of merited confidence each local operating corporation. They must, with or without the banker-promotor's support, somehow restore the former prestige and with it an expectation and confidence in local fair dealing of gas-utility managers. If we can have the aid of electric, transportation and other contemporary and neighboring utility managements, so much the better. But in any event, *as gas men*, we must solve our problems; and the sooner, the better.

Meeting political criticism is not easy this year. The same course as is outlined for the holding-company problem, in the preceding paragraphs, is suitable here also. And readers are reminded of a suggestion made in the JOURNAL the first of this year (January issue, p. 25) as to the establishment of a citizens advisory council. If any local gas companies have followed that plan, they will surely be glad of the aid of informed local friends when rabid political attacks threaten.

In some cases a "back fire" of vigorous sort is needed. The public press can usually be employed for this, both by advertising and by proper news and interviews. When a company that is under such attack feels sure of its ground, why not come right out and meet the charges with some such reply as this—

IS CANDIDATE BLANK SINCERE?

1. He says we cheat the public. We ask him to prove this publicly or to retract his statement fully.

2. We ask all the public to look into the facts regarding gas in Ourtown. We believe you will refuse to accept any false charges made against us.

3. Men should be elected to public office who are capable of learning the truth and who will not campaign on the basis of false or insincere claims.

4. We do not participate in any partisan or other political controversy. That is not our business. But we shall take every proper means for opposing any person for any public office who tries to make an issue out of the honesty or fair-dealing of our company. If we are not honest, we should be disciplined. But that is not a political question.

Ourtown Gas Works, Inc.

When such an advertisement is ready in proof form, a copy might well go to the candidate for his information—that is, if he appears at all sincere. He may prefer to rip out such plank from his platform before it is remade into a trapdoor for his discomfiture.

The natural gas problem is too big to handle here. Suffice it to say—it is a *real* one. A later article is going into that subject more fully.

MEETING the hard times bogey man is no less a responsibility. It is not safe to ignore the charge that the gas man gets his profit even when every one else loses his job or takes a cut. And such charges are common today. What is the real answer?

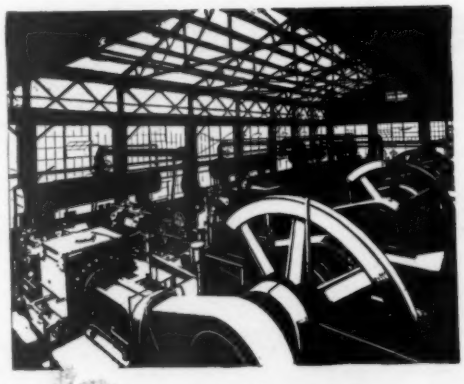
Gas supply goes on in hard times as well as boom periods. We sell somewhat less gas; but we are so organized as to adjust our affairs to changing sales. We therefore suffer less severely now than many others. But—and right here we score our bulls-eye in public favor—what about boom years? We made no huge profits then. How can we now fairly be asked to cut further into our reserves? Does not our present curtailed earning adequately punish us, when we were never allowed to make boom-time profits?

Would it not be best if all the industries could do as we, hold to more uniform earnings and keep the maximum number of all employes always on a steady job? Is not our stability in power to earn, which means chance to hire and pay men, our greatest contribution to the community as a whole.

If most folks are at heart fair—and we think they are—is not such argument likely to be acceptable?

In Washington we had this very year an evidence that such sound philosophy pays. Gas sales were to be taxed by Uncle Sam. Congress studied the character of gas use, heard the facts as to who would be burdened by such tax, and passed on to tax other items instead. This decision was not altruism. It merely recognized fairly the basic household *necessity* of gas. No frills,

no tax! Will not similar argument be persuasive in regard to *fair* rates of gas-company operating profit even in these difficult times? It is likely to be so, not universally perhaps, but surely in most well-served gas areas.



RECENTLY Senator Borah in the discussion of debts owed by European countries to the United States, suggested that it is never possible for a government to indulge in altruism. He pointed out that the interest of the public must be the criterion by which to judge the reasonableness of the debt readjustment. A slight paraphrasing of his reasoning applies here. Local governments and local politicians cannot be altruistic in their attitude toward the public utilities. We need not ask them to be. But they can, indeed they must, seek the general public interest. And it is up to the gas man to convince such officials and the local responsible governing authority that straightforward fair dealing has been practiced. Or, if such a conviction is not in accord with the facts, then to fix the company's practices so that such conviction can be accomplished.

No advantage will be gained by pussyfooting. No possible good can come from ignoring the issues. The public *believes* many things which are not so.

In the current issue of an outstanding national magazine the widely known Professor Ripley headlines a more-or-less sane article

"PUBLIC UTILITIES INSECURITIES"

or perhaps the editor chose the title. But the choice of this title demonstrates clearly that either the author or the editor, or both, believed the implied criticism of utility securities.

If men of responsibility and capability such as this author and this editor unquestionably are standing on so fallacious a theory as this, then surely our industry must be in real need of better public understanding of its affairs. To accomplish this nationally is not feasible in itself. But let each utility clean house if need be, make the facts known to the public, and the correct local good-will will follow. And if enough local companies do this, then the national public opinion will take care of itsef.

The Small Concerns to the Fore

DURING the past two years adversity has led to a new questioning of old beliefs, particularly as regards size; and there seems to be some indication statistically that the trend toward large enterprises, which has been significant over a period of years, has definitely turned. A study of earnings made by over 1100 individual industrial concerns during the past 20 years showed that those firms having investments of less than 2-million dollars each had rates of earnings 26 per cent greater than firms with larger investments. Large size alone, in other words, while impressive, is by no means the basic reason for success.

As the census data for 1929 become available, we note some further interesting trends in the field of our industrial organization. In the post-war period, until recently, there has been a steady decline both in the number of firms and in the ratio of the smaller firms to the total. This trend had changed, however, by 1929, a substantial increase in the number and the proportion of smaller firms having taken place since 1925. The figures also show that in 1929 well over two-thirds of the total number of manufacturing establishments were in the smaller group, with an output of products valued at less than $100,000, while 90 per cent of the firms were in the group with products valued at less than $500,000.

Another interesting change of trend is brought out with regard to the number of firm members and proprietors in manufacturing industries. There was a decline from 173-thousand in 1921 to 133-thousand in 1925, but this trend was sharply terminated by 1927 and the total number had started to increase by 1929.

The indications are, then, that the smaller establishments, after some post-war losses, were holding their own and even gaining ground, in competition, before the present depression set in.

I see no grounds for being pessimistic about the future of our small concerns —*Fred'k M. Feiker, Director, Bureau of Foreign and Domestic Commerce, before Second Annual Conference on Management Problems of the Smaller Industries.*

Utility Should Encourage Experimentation

WE must make the public dissatisfied with the gas appliances now owned, through re-design of appearance, performance and product features such as will make it want the new, in preference to the old, more than it wants other products and, within reasonable limits, irrespective of price. We must make the public conscious of the modernity and convenience of gas and of the re-designed gas appliances because it cannot be physically impelled to buy until it is led to mentally prefer to purchase and enjoy the comforts of gas. The utility should show a willingness to push new devices. Who may be expected to readily accept and to pioneer new gas devices if the utility will not? It should go so far as to encourage experimentation (by the manufacturer) in new devices—and to sound market reaction upon them, even though the device may not be in its latest state of development. It is the broad principle of the thing in which the utility is concerned and the marketability of which he must attempt to discover, before the manufacturer has made a perfectly operating machine. The pioneer's part is a hard and thankless one as he suffers all the grief. He suffers the condemnation of the service department, who are not always sympathetic nor understanding of the sales department's viewpoint. —*W. Frank Roberts before the Metropolitan Regional Gas Sales Conference, A.G.A.*

House Heating Service

Sold by Window Displays

STUART BRATESMAN

Manager, Display Department, Boston Consolidated Gas Company

AUTOMATIC gas house heating is one service where the prospective consumer cares little about what the equipment looks like; his big question invariably is, "What will it do and how much will it cost me per year as compared with other methods of heating?"

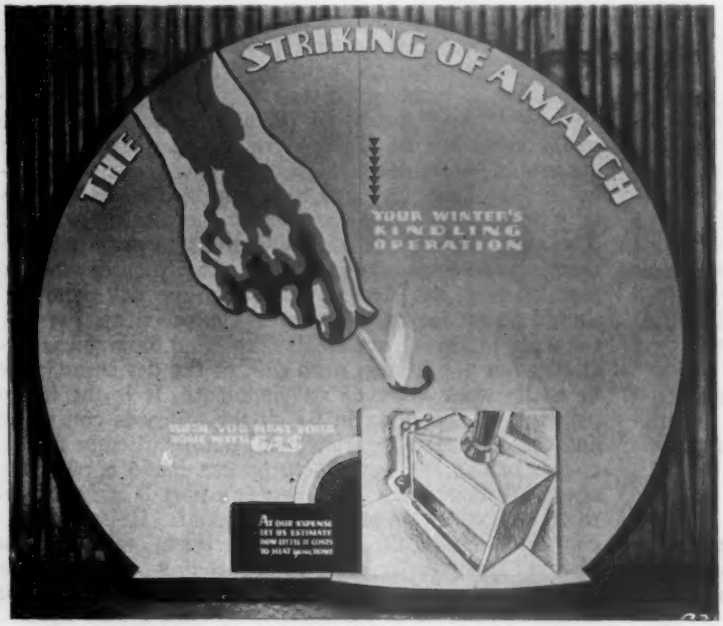
Thoughts to Be Stressed

In advertising house heating, especially in window displays, the thoughts of convenience, ease of operation, cleanliness and efficiency must be driven home with a punch. To interest people in gas house heating we must first arrest their attention with something of interest to them, personally. Window displays offer great opportunities for this personal touch.

Reproduced with this article are three window display advertisements from a recent series used by a large eastern gas company. They all sell gas house heating...and are still selling gas house heating. These displays educate the public and are therefore more effective than sets that merely "display" the heating equipment. There is an underlying thought behind each one. Suppose we study them and see what lies behind the scenes.

CONTROL
HEATING YOUR HOME WITH GAS THE AUTOMATIC CONTROL OF TEMPERATURES RELIEVES YOU OF ALL FURNACE TENDING ...SIMPLY SET THE WALL THERMOSTAT TO ANY DESIRED TEMPERATURE
WITHOUT CHARGE WE WILL BE GLAD TO ESTIMATE HOW MUCH IT WILL COST TO HEAT YOUR HOME WITH GAS NEXT WINTER

The advertisement with the giant hand holding the lighted match arrests the attention through its huge proportions and poster treatment. The flame was painted on cloth, in transparent colors, and illuminated from behind. The effect, especially at night, was very realistic.



The timeliness of the baseball pitcher display was doubly emphasized by the fact that when this display was first set in the windows the city's representative in the National League was out in front by three full games, and going strong. The town was literally baseball-mad. This display stopped people who under ordinary conditions had little or no interest in baseball. Having the pitcher apparently delivering the ball directly at the reader gave this display added dramatization. The copy emphasized the automatic control of gas heating, directly tying the headline and following copy together.

Again, in the display with the housewife walking downstairs, the thought of effortless operation is driven home instead of merely having the heating equipment present. This advertisement is very modern in its presentation in that it conveys its message in as few lines and areas as possible. Instead of drawing the entire figure of the woman there was shown merely the legs and feet, just enough to convey the thought ot climbing countless cellar stairs. Copy in this set was also reduced to the minimum.

All of these displays attempt to sell passersby on the conveniences of automatic gas house heating, but notice that in none does the actual equipment appear. Window displays of this type go a long way towards interesting people in house heating with gas. They cost very little to prepare, when compared with other forms of advertising, and pay great dividends. Use them in your windows when you advertise gas house heating.

Two-Dollar Dinner Party for Four

DINNER parties remain the favorite form of entertaining despite hard times. The women of Northern and Central California have discovered that they can serve delightful meals at a trifling cost and with little bother by taking advantage of present-day prices and making full use of modern kitchen equipment. Obviously proud of their achievements, hundreds submitted their menus and methods in the contest on "A $2 Dinner for Four—What I Serve and How I Prepare It."

First prize in the contest went to Mrs. Freda Palm, Oakland, who sent in an attractive menu to serve four persons for only $1.42 and furnished instructions on how to prepare the meal easily. Mrs. Palm's paper follows:

"*Menu*—Mint, grapefruit and pineapple cocktail; mock chicken legs with gravy, baked potatoes, peas and carrots; hearts of lettuce with 1000 Island dressing; wholewheat rolls and butter; raspberry bombe and coffee.

"*Cost*—Mint candies, 5 cents; grapefruit, 5 cents; small can pineapple, 10 cents; meat, 45 cents; potatoes, 2 cents; peas, 10 cents; carrots, 4 cents; lettuce, 10 cents; salad dressing, 5 cents; raspberries, 5 cents; sugar, 3 cents; cream, 20 cents; butter, 6 cents; milk, 5 cents; flour, 5 cents; coffee, 2 cents; total, $1.42.

"I couldn't prepare this meal under $2 without modern appliances. My gas range and electric refrigerator enable me to do it.

"The cocktail can be made early and kept in the refrigerator. For the salad, I halve heads of lettuce and add the dressing.

"Mock chicken legs are cubes of pork and veal on wooden skewers, dipped in milk and bread crumbs browned in hot fat, covered with milk thickened with browned flour, then baked ninety minutes at 350 degrees. I prepare the meat and vegetables in the morning. At 4:30 I put the meat in the oven and at 5:30 vegetables and rolls. At 6:00 dinner is ready.

"For raspberry bombe I make vanilla ice cream and raspberry sherbet the day before. In the morning I pack the ice cream around the inside of a large mold, fill the center with sherbet and put it in the refrigerator to set. It is served sliced." —*P. G. & E. Progress*

High Window Display Honors

WINDOW display and poster advertising of the Consolidated Gas Company of New York received special honors during the month of June, by winning prizes in three national contests, according to an announcement by Oscar H. Fogg, Vice-president in charge of Commercial Relations.

A window display of the Company won first prize in the George Washington Bicentennial Contest conducted by the International Association of Display Men. This award is considered to be of unusual importance, since window displays of department stores, banks, and all classes of business institutions in the United States and Canada were entered. The award includes a certificate signed by President Hoover, and filing of a photograph of the winning display in a permanent exhibit at Washington.

Another window display of the Company won first prize in Class 7 of a contest sponsored by the Merchant's Record and Show Window, a trade publication. This Class included public utility and bank displays.

A poster of the Company was also awarded second prize in the Electric, Gas, and Transportation Division of a national contest conducted by the Public Utilities Advertising Association.

R. M. Martin is Director of Display for the Consolidated Gas Company of New York.

AMERICAN GAS MERCHANDISING ALMANACK

September

1932

SEPTEMBER sees autumn ushered in; it brings cool weather and a host of fruits and vegetables that thrifty housewives will put up in the form of pickles, relishes, apple butter and jelly for the starved kiddies returning from school and for general winter consumption.

Fall for the small-towner is a restful, welcome season; fragrant odors of autumn leaves and sweet scents of ripened wood smoke smack of the coming of frost. City folks, too, welcome fall. The first chill in the air whets appetites and warns: "How's the heating plant?"

Fall window displays should feature auxiliary gas heating and inserts with the customers service accounts should declare: "Be Thrifty; heat the home with gas the carefree fuel—heat that living room—gas heat is flexible, swift and economical."

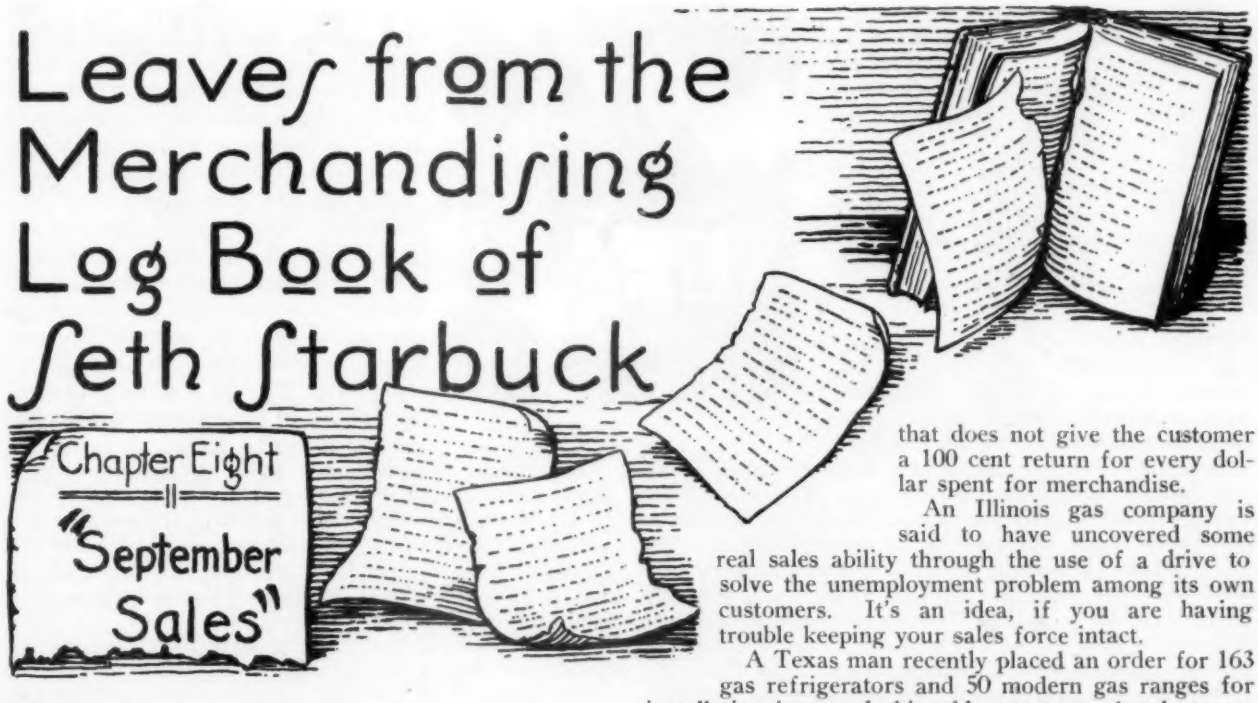
Display gas heaters and gasteam radiators in your windows and on your store floor. Place cards beside them suggesting to the thrifty that if heat is required you can do it quicker and better with gas.

Back drops may be of the autumn colors and a bit of blue and pink may be thrown in with discretion. Autumn leaves, morning glories, sunflowers—or their near relation "nigger heads"—and, where obtainable, field daisies may be employed in connection with your displays. A window featuring home canning will also draw attention if attractively arranged. With such a window use fruits and vegetables and dwell on the idea of THRIFT.

September is a month for real selling, so plan to sell.

1—Thur.	**Hang a huge banner in your window that says: "GAS FOR THRIFT."** Japan visited by earthquake, 1923.
2—Fri.	**Run a heating advertisement in newspaper.** Hiram Johnson, statesman, born, 1866.
3—Sat.	**Get your advertisement for Sunday newspapers.**
4—Sun.	Hudson River discovered, 1871. Citizens Gas Light Company, Willimantic, Conn., granted permission to lay gas mains to supply Willimantic with gas, 1890.
5—Mon.	Labor Day; and how many millions there are who would they might. C. M. Cohn, Vice-President Consolidated Gas Electric Light & Power Co., Baltimore, selected to head committee for parade of city's drafted men, 1917.
6—Tues.	James K. Hackett actor, born, 1869.
7—Wed.	**Run newspaper advertisement on auxiliary heating.** Boston settled, 1630; it's gas heater time there 'bout now.
8—Thur.	**A good place to sell gasteam.** St. Augustine settled, 1565.
9—Fri.	California admitted to Union, 1850. They don't need furnaces in Southern California, but oh! how good that gas heater feels after sun-down!
10—Sat.	**Send advertisement to newspaper featuring the flexibility of gasteam heat.**
11—Sun.	William Allen White's state, Kansas, got its first telephone exchange at Topeka, 1879.
12—Mon.	**Change your window display advertising.**
13—Tues.	**Take advertisement to newspaper for Wednesday's issue.** Scott enters Mexico, 1847. George G. Ramsdell elected one of directors of Vincennes Gas Light Company at annual election; Mr. Ramsdell also appointed Secretary, Treasurer and Superintendent of the company, 1886.
14—Wed.	**Rearrange the display on the floor of your store.** Washington joined Lafayette at Williamsburg, Va., 1781. Massachusetts Electric & Gas Association held 28th annual meeting at Boston, 1917. S. G. Bodine elected director of Welsbach Company at annual meeting, 1904.
15—Thur.	William Howard Taft, born, 1857.
16—Fri.	Florida, another good gasteam country, visited by quite a blow, 1926. Alabama Public Service Commission granted petition of Mobile Gas Company to increase rate 25 cents per thousand cubic feet, 1918.
17—Sat.	Washington delivered his farewell address, 1796.
18—Sun.	First battle of Saratoga, 1777. If the evening is chilly chase the chill by lighting the gas wood fire in the grate.
19—Mon.	Samuel Johnson, English historian, born, 1709.
20—Tues.	**Send your advertisement to newspaper.**
21—Wed.	Ember Day.
22—Thur.	Samuel Adams, revolutionary patriot, born, 1722.
23—Fri.	Autumn begins—time to think of GAS and Carefree fuel for home heating in earnest and to tell folks of its merits.
24—Sat.	Black Friday, 1869. **A good day to check over your activity to see if it needs to be built-up at any point.**
25—Sun.	Make some mental plans for October Convention.
26—Mon.	**Change your window display advertising.** George Gershwin, composer, born, 1898.
27—Tues.	**Time to evacuate antiquated heating methods and turn to GAS.** Belgians evacuated Alost, 1914.
28—Wed.	Pennsylvania, of natural gas fame, adopted a state constitution, 1776.
29—Thur.	Michaelmas.
30—Fri.	Your month's activity is over but we'll have another suggestion to you for October about the 20th of September, so sit tight. Make up your mind to attend the A. G. A. Convention this year.

Leaves from the Merchandising Log Book of Seth Starbuck



EVEN during an economic upset we find many encouraging items to jot down in our note-book. The manufacturer of a well known line of gas ranges has just launched a sales plan based on the fact that, "Today's housewife is going back into the kitchen. It is now popular for her to do her own housework. To do so, however, she needs up-to-date household equipment, and she can conveniently get it"; then follows the plan which includes a series of newspaper advertisements that we like. "GAS the ideal cooking fuel. It's faster, cheaper, better, more dependable," is a slogan contained in each ad.

Another item of news that is going to cause a big selling effort by water heater men is the announcement of a customer-controlled gas water heater that has made its debut. At last the man who can't sell automatic hot water service to the home "because folks say it costs too much" hasn't a leg to stand on. This heater, so we understand, has taken all the bugs out of the customer's come-back. Hot water service and gas consumption are entirely in the hands of the customer. We expect this item will boost the sales per meter; and how!

WORTHWHILE, is the idea of telling the customer HOW to get more gas service for less money, by operating appliances with an eye to the thrifty. The old "how" plan used in days gone by has been revived and is being used with good results by the New York Power and Light Corporation, who tell customers via a bill insert how to operate gas appliances most efficiently. From down Dixie way comes a tale of how the Birmingham Gas Company staged a real style show in which a number of gas range manufacturers took part as did the manufacturer of a gas refrigerator.

From many sections of the country come reports of the buyers' revolt against cheapness. There is evidence that the great American home manager and purchasing agent, as well as the man behind her, is demanding Quality and not cheapness in merchandise. And let that be a lesson to you. Gas men should do their very best to keep up the desire for quality by offering nothing that does not give the customer a 100 cent return for every dollar spent for merchandise.

An Illinois gas company is said to have uncovered some real sales ability through the use of a drive to solve the unemployment problem among its own customers. It's an idea, if you are having trouble keeping your sales force intact.

A Texas man recently placed an order for 163 gas refrigerators and 50 modern gas ranges for installation in two fashionable apartment hotels to replace his present electrical equipment." There's a story; it's fashionable to use gas for heating and refrigeration —and gas the flexible fuel offers a new opportunity via the THRIFT theme for complete and auxiliary house heating this fall. Hop on the heating band-wagon. here's some hints that may help you.

IN looking about for a logical load builder at a time when sales resistance is assumed to be unusually high and super-salesmanship is sunk, we know of nothing that should attain the desired results more quickly than an activity to sell gasteam radiation.

Here is a load that fits into the season; one that will not call for any main extensions; one that will not retard the sale of complete home heating systems and one that will afford the salesman a worth-while commission. In looking over our file of plans that have "clicked" in the past, we find that those activities which were built around a market survey have been the most successful.

A plan designed for the New England territory will serve as a basis for our proposed set-up. If the reader happens to live on the west coast, or south of the Mason and Dixon line or in the great mid-west, the ideas set down in the following paragraphs, with a bit of re-vamping should serve him. The manufacturer of one nationally known gasteam radiator made a survey of this particular territory for the purpose of ascertaining its potentialities and found that sales might reasonably be expected to come from the following sources: Commercial Institutions, 30%; Residential Customers, 30%, Industrial Establishments, 10%, Churches, 5%, the balance, 25%, were too varied to classify, ranging all the way from a watchman's shanty to a ticket taker's booth on a toll bridge.

Breaking down this listing you will get a classification that runs something like this: Small Stores, Small Specialty Shops, Professional Offices, Lodge Halls, Waiting Rooms, Dance Halls, Soda Bars, Hot Dog Stands, Inns, Beauty Parlors, Amusement Halls, Churches, Studies, Rooms in Churches, Sunparlors and many of what every home calls "that cold room."

The appeal to all classes in this election year, 1932, should be made on the basis of THRIFT. Here is an appeal that will immediately gain attention and respect. "Don't start the furnace until after Christmas; Install Gasteam to Save your fuel and your firing and for real comfort, convenience and THRIFT," may give you an idea of how we would get over the story.

But here's the suggested set-up for September Selling.

THE dates and the plan being worked out should be turned over to an executive for presentation to your organization. This should be done at a meeting of all salespeople (preferably all employees) and such other employees as will have a part in the activity. At this meeting the executive sending the invitation should be in charge and should open the meeting. After welcoming those in attendance he should briefly outline the activity and state definitely what he expects, what it will give the company in the way of new business and what it offers the employee in the way of extra earnings. This done, the meeting should be turned over to the sales manager.

The salesmanager should then announce the dates of the activity and explain the plan in detail. He should also assign quotas and explain how sales people and employees are to be compensated; how sales are to be reported; how "splits" in commissions or points will be divided; where employees are to be compensated for leads. Where a contest is to be employed to put a little play into the activity, this should also be explained in detail by the sales manager; if teams are to compete the captain and personnel of each team should be announced and the captains should then be instructed as to their duties and provided with the necessary forms to report sales, etc.

The advertising man should follow the sales manager on the program. It is his duty to exhibit proofs of all advertising to be used to promote the sale of gasteam during the activity. Newspaper advertising, direct mail pieces, store folders and cards, truck banners and any other advertising should be exhibited and sold to the employees and sales people. It is the duty of the advertising manager to sell these folks the idea that such material will prove very helpful to them if they will but give it their full support. If they will read the advertisements sent out by the company they will be able to tell better the story of the efficiency, the flexibility and the economy of gasteam heating, and make more sales.

The advertising manager should also explain how window display advertising and properly arranged store exhibits aid in making sales.

IT is assumed that the district salesmen will be thoroughly conversant with gasteam, its possibilities, how gasteam radiators are constructed, how they operate, how to figure installations, etc. (This information may be secured from the manufacturer. One or two meetings should be held by the sales manager with his men to make sure that they have the necessary knowledge before the activity actually gets under way. Aside from the importance of the salesmen knowing their gasteam, we think the rank and file of employees, who are to participate in the activity, should have sufficient knowledge of the advantages of gasteam to talk about it intelligently. This may be accomplished through reading the literature provided for consumer use by the manufacturer.

Advertising for such an activity should be carefully planned and all mailings, display material, etc., should be ready at the outset of the activity. Newspaper advertising and direct mail advertising should tie-into the campaign theme. The direct mailing should go only to picked lists and should be planned to reach them on a certain day each week.

We recommend that the big advertising barrage be laid down during the month of September and that, while it should be followed by a consistent advertising campaign during October and November, the frequency of such advertising diminish gradually until the first of December, when it should end. December is rather a slow month for the sale of gasteam, yet in an activity of three months' duration there will be some prospects still hanging fire in December who may be sold.

If you wish to conduct a contest for your employees you will find any number of plans that may be adopted for this activity by referring to your file of *American Gas Journal.*

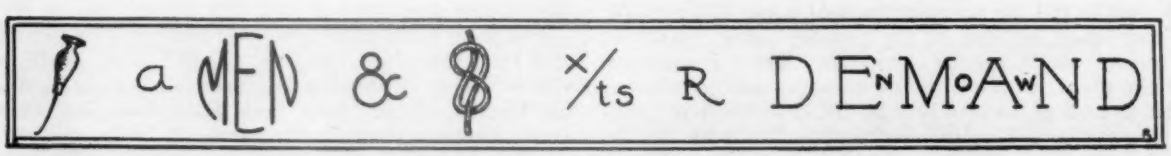
If you should like to use a rental plan in connection with this activity, the same source will provide you with ideas around which you may model your plan.

SELLING gasteam is a job for the specialist, and one or two good men interesting themselves in this class of business should be able to make a very good income during the next three months, as well as provide a nice added load for the gas company.

Salesmen should not be assigned too large territories in selling units of this type. (When we spoke of two men above we recall how two men made quite a record on 5,000 meters one season.)

Compensation for selling gasteam may be straight commission, commission and special bonus per section, or a flat price per section. We have seen all three plans work out very well.

So let's see you selling in September, and we'll dig into the Log Book for another suggestion for you for October.



Starbuck's Rebus—Answer on page 46

Effective Advertising Appeals

Analyzed by The Copy Writer

No. 3 Anticipating the High Bill Complaint

"WHY," a business writer recently asked, "will people raise the roof about gas, electric light and telephone bills, even though the amounts are relatively trifling? The time and effort which a telephone saves is incalculable. Gas, subway rides and electric light and power are among the cheapest items we buy. Yet every one seems to pay his public utility bills grudgingly, notwithstanding that the utilities give amazing value. The same people will blow in ten times as much money on radios, golf, automobile tires, gasoline, hats, shoes, silk stockings and tenth-of-a-cent bridge and never whisper publicly."

Every utility manager has asked himself this question, not once but many times. The answer is always the same—Human Nature. Occasionally this gives rise to a second question—can anything be done about it?

GAS BILL
THE CALLING CARD OF A FRIEND
THE next time you open your gas bill, stop a moment to think about what you have received for the amount you are asked to pay. Compare the comfort, convenience, and leisure time you have bought with the price of anything else you purchase.
You will find that gas is the least expensive thing you buy—and the most valuable. Should you decide that this is *not* true in your particular case, then you may be sure you are not allowing the Great American Servant to do all it can do for you.
Let it show you the joys of completely automatic hot water. Let it provide perfect automatic cooking—a cool kitchen and hours more time for recreation. Let it show you the way to the most silent, the swiftest, and most satisfactory automatic refrigeration in the wide world. Then you *will* agree that your monthly gas bill is indeed the calling card of a friend.
BROCKTON GAS COMPANY

There are many ways of achieving the satisfactory settlement of a high bill complaint after the customer has become vocal. There is only one way, however, of forestalling the complaint (for we are assuming that no matter how low your rates may be, complaints will still arise), and that way is public education. In a word, advertising.

There has been a good deal of advertising of this nature from time to time. One large southern utility has been doing it both consistently and intelligently for a number of years, using human interest experiences of daily or seasonal occurrence to drive home the fact that the monthly bill not only represents the rendering of vital services, but also that its total varies according to the living habits of the customer's family. "Yes, thanks, she's better now—but we had quite a siege of it"—this headline, illustrated by the picture of a convalescing child, introduced a message telling of the value of utility services during an emergency and stressing the fact that more gas and electricity is used during periods of illness. Another advertisement in this series carried the heading, "He's more precious Than Rubies," drawing the obvious lesson of what a newcomer to the family means in the consumption of gas.

A Novel Advertisement

The winner in the electric institutional division of this year's Better Copy contest of the Public Utilities Advertising Association was an advertisement that very cleverly translated the monthly bill in terms of the day-to-day cost of various conveniences. Under the heading, "What a Bill for Electric Service Really Says," the total of $3.02 was divided as follows: Lighting, 6c a day; Radio, 1¼c a day; Cleaning, ⅓c a day; Washing, ⅓c a day; Ironing, ¾c a day; Coffee, ½c a day; Toast, ⅓c a day; Total, (average for all uses) 10c a day.

The same thing might have been done in connection with gas service, although nearly all the advertisements of this nature that we have seen have been those of electric companies. This is one place, however, where we need not be ashamed of learning from our electric friends. "If We Itemized Your Electric Bill . . ." is the beginning of another analysis—this time of a bill for $9.55, which included cooking and refrigeration in addition to the other items shown above.

"One Bill Takes the Place of Many" is the way a combination gas and electric company sums up the proposition for both of these services. It follows by saying, "Instead of a bill for heating, another for refrigeration, one for laundry, for cooking fuel and so on, gas and electricity provide all these and more at sur-

prisingly low cost." Another approach might be to ask your customers to "Suppose you could pay all your bills with one check?" Too many people minimize the value of utility service merely because they pay for it in one lump sum. According to this reasoning, the more perfect the service, the less it is appreciated. The customer is unconscious of the company's activity except for that moment when he receives the bill.

Such an attitude, which is all too common, must be counteracted by reiteration of the fact, as represented by another electric advertisement, that "This is *not* a light bill. It's an investment in health, freedom, convenience."

It is a good workable theory that most people, if permitted to itemize the value to them of the various conveniences which they enjoy through the medium of gas service, would place the total considerably higher than the amount of the bill. This actually worked out in practice during the course of a survey among private dwellings conducted by a gas companv preliminary to a drive for house-heating sales. Each prospect was asked to give his estimate of the value to him of getting rid of certain inconveniences connected with his present heating system. Each item amounted to only a few pennies a day, but in every instance the aggregate was considerably greater than the difference between the cost of gas and that of the fuel in use at the time.

Public Can Be Taught

There is no question, therefore, that the public can be taught to appreciate the value of gas service on the basis of its merits and of their own requirements. For example, "Your Gas Meter indicates time saved from time-wasting tasks," from the A.G.A. Copy Service, demonstrates that the gas bill is simply a host of old expenses modernized and grouped under a single monthly charge. "Perhaps your gas bill is too low!" it strikingly suggests, and then meets the challenge of the reader by showing that new applications of gas do not necessarily increase household expenditures, but work for "true economy." Another advertisement goes so far as to recommend, "As a Measure of Economy You Should *Increase* the Amount of Your Monthly Gas Bill"; for "gas is about the cheapest commodity you can possibly buy."

In such ways it is possible for this important type of "good will" or educational advertising to work into the promotional program of the company; for an understanding of the gas bill is a long step in the direction of full appreciation for all the advantages of the service. It is still only one bill no matter how many additional appliances are installed. And so "Stop That Big Parade," referring to the parade of monthly bills, is how another utility describes the possibility of combining many bills into one, without increasing the total amount to be paid.

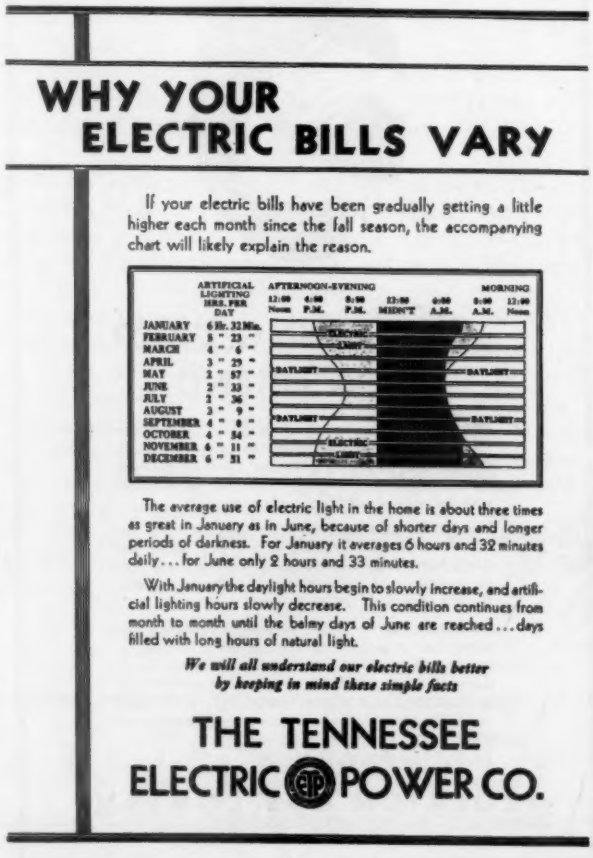
The variation of the bill from month to month is always difficult for the average customer to understand. Sometimes, of course, this is due to differences in the date of reading the meter, and the customer should realize that such a variation equalizes itself in the course of time. It is much more difficult to satisfy a complaint resulting from seasonal variations. It is safe to say that many complaints of this nature could be prevented by an occasional advertisement showing in graphic chart form the rise and fall of the average use of gas in the home depending upon the variation of degree day temperature during a stated period. "Why Your Gas (or Electric) Bills Vary" is a standard heading that has been used frequently for copy using this idea.

The use of temperature comparisons in this connection is safer than basing your conclusions on the calendar. The latter is usually sufficient to show the trend in consumption of electricity. It will not do, however, for gas service, as was shown during the last mild winter when high-bill complaints were comparatively few. There is going to be a different story this winter, if the season is a normal one, and the low bills of last year will only serve to increase the agitation in 1932-33 unless some pretty effective educational work is done early this fall.

Removing The Sting

Of course, any bill is an unpleasant interlude, even though it enables us to make use of the commodity which we have bought for a considerable time before having to pay for it. Anything that serves to place the gas bill in a friendly light is an investment worth trying. One company advertises it as "The Calling Card of a Friend." A telephone company recently sent out a leaflet to all of its customers with the title, "Our Mutual Friend, 'Bill'."

What is a bill after all? It is the tangible part of any transaction. It represents value received—a promoter of the general welfare, especially if not allowed to hang around too long. The gas company sends out its bill for the service it renders. It also pays many bills—for labor, taxes, materials of all kinds. The principle is substantially the same in each case: If both sides to the transaction receive a proportionate benefit, there should be no complaints. There will be fewer if the gas company continues to take its customers into its confidence, through advertising.


WHY YOUR
ELECTRIC BILLS VARY
If your electric bills have been gradually getting a little higher each month since the fall season, the accompanying chart will likely explain the reason.
ARTIFICIAL LIGHTING REQ. PER DAY
AFTERNOON-EVENING
MORNING
12:00 Noon
4:00 P.M.
8:00 P.M.
12:00 MIDN'T
4:00 A.M.
8:00 A.M.
12:00 Noon
JANUARY 6 Hr. 32 Min.
FEBRUARY 5 " 23 "
MARCH 4 " 6 "
APRIL 3 " 29 "
MAY 2 " 57 "
JUNE 2 " 33 "
JULY 2 " 36 "
AUGUST 3 " 9 "
SEPTEMBER 4 " 8 "
OCTOBER 4 " 54 "
NOVEMBER 6 " 11 "
DECEMBER 6 " 31 "
ELECTRIC LIGHT
DAYLIGHT
The average use of electric light in the home is about three times as great in January as in June, because of shorter days and longer periods of darkness. For January it averages 6 hours and 32 minutes daily... for June only 2 hours and 33 minutes.
With January the daylight hours begin to slowly increase, and artificial lighting hours slowly decrease. This condition continues from month to month until the balmy days of June are reached... days filled with long hours of natural light.
We will all understand our electric bills better by keeping in mind these simple facts
THE TENNESSEE ELECTRIC POWER CO.

EQUIPMENT NEWS

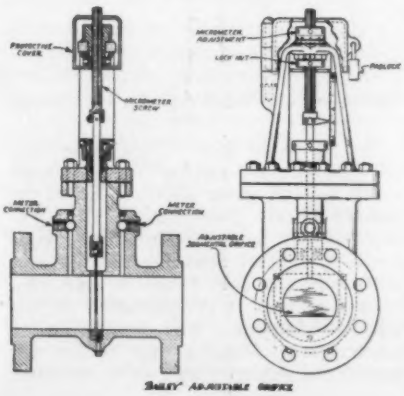
New Pipe Boom for Tracks on McCormick-Deering Crawler-Tractor

The Highway Trailer Co., of Edgerton, Wis., is now manufacturing a new high-capacity pipe boom for their pipe line crawler-tractor. This new unit is a side boom of the live type and, in combination with the Model GH tractor, will be known as the Trackson-Highway Pipe Layer. Its development is the result of much field research and the active cooperation of pipe line contractors who have long been seeking a high efficiency unit that is without the disadvantages of unwieldy size and excess weight. The counterweights are placed effectively without being obstructive. Its size and weight are ideal for easy maneuvering in close quarters. Natural hand-wheel steering and convenient levers permit speedy operation and easy, accurate control over any kind of ground. Lifting capacity is ample for the larger sizes of pipe Without stiffleg, and with the load 2 ft. out from the tractor, the lifting capacity is 19,875 lbs. Both boom winch and lifting winch have worm and worm gear drive with the safety feature of lowering under power. Power take-off is of a heavy-duty type especially designed for the Model 20 McCormick-Deering and provides two speeds forward (low .48-1, high 1.1) and one reverse (1.1). The whole boom and frame assembly is hot riveted and electric welded. Bolts are used only where disassembly might later be necessary. Guide sheave and sheave blocks have patented oilless bronze bushings Full details may be secured by addressing either the Highway Trailer Co., Edgerton, Wis., or the Trackson Company, 1320 So. First St., Milwaukee, Wis.

Trackson-Highway Pipe Layer

Bailey Adjustable Orifice

For Fluid Meter installations where it is desirable to obtain accurate measurements over a wide range of capacity, the Bailey Adjustable Orifice has been designed by the Bailey Meter Company, Cleveland, Ohio. This product is particularly suitable for use with meters measuring gas or low pressure heating steam, since on these services the desired capacity is often dependent upon the season.



As illustrated the adjustable orifice consists of a flanged body with integral meter connections. It can readily be installed in a steam, water or gas line and connected to any differential head type of Fluid Meter. The adjustable orifice functions similarly to the commonly-used fixed type of Bailey segmental orifice. A micrometer adjusting screw permits setting the height of the gate segment within .001 of an inch. When it is advisable to change the capacity of the meter, it is simply necessary to set the micrometer screw at the reading corresponding to the desired maximum capacity, as obtained from curve sheets furnished with the orifice.

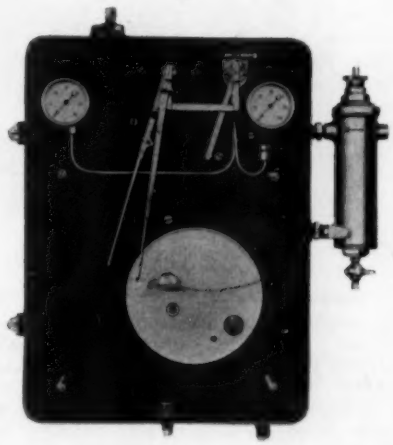
The Adjustable Orifice permits changing the maximum capacity of the meter as much as 40 to 1 and consequently is equivalent to a multitude of fixed orifices. The change may be made in a few minutes time without disrupting meter operation or diverting the flow through a bypass line.

Descriptive Bulletin will be mailed on request.

New Metric Rotary Pilot Valve

The American Meter Company, New York, announces the publication of Bulletin E-5 covering Metric Control for flow of gases and liquids and describing an important new development, made possible by the Metric Rotary Pilot Valve.

The principal new features are an automatically adjusted opening for release of pressure from the diaphram head which greatly reduces the amount of gas used for control; the elimination of tank and outlet throttle valve control, and a simplicity which assists in adjusting and cleaning.



Metric Rotary Pilot Valve

Changes in the time element can be made by adjustment of a single micrometer screw and the unit can be used either with an open or closed type controlled valve by a single adjustment.

Copy of Bulletin E-5 will be mailed on request.

Bulletin Issued on Temperature Controllers

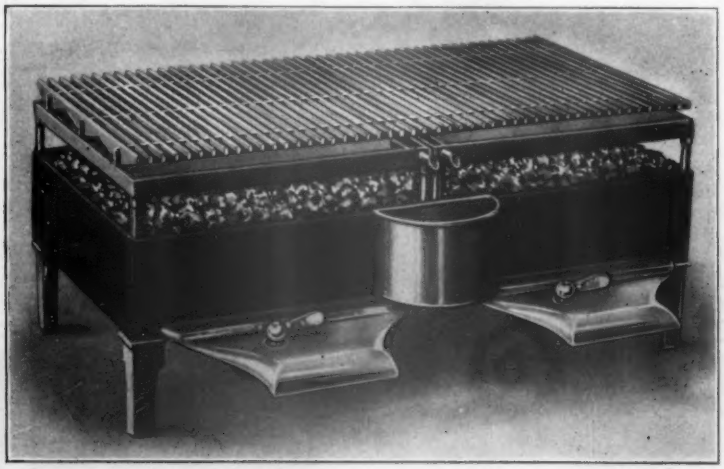
Interesting engineering information on Temperature Control is contained in a Bulletin recently issued by the Foxboro Company of Foxboro, Massachusetts.

This well illustrated, 48-page bulletin describes the operation and construction of Foxboro Temperature Controllers and their uses in industrial processes.

Copies of this bulletin—No. 177—may be had by writing to the Foxboro Company.

A New Radiant Broiler With Many Advantages Over The Charcoal Method

Homestead Heater Co., Newark, N. J., are placing on the market a new gas appliance of great interest to the gas industry. It is a gas fired radiant grill—an over-the-fire broiler. It is built in sections and any number of sections may be combined to meet any size requirements. One illustration shows a single section grill and the other a two section grill.



Two Section Homestead Grill

A charcoal fire has always been credited with imparting a particular delicacy of flavor to steaks and chops. It has been assumed the charcoal fuel was responsible. However, the manufacturers of this new Over-the-Fire broiler claim that their tests indicate that it was the method of cooking over the red hot coals that was responsible, not the fuel. Meats cooked over-the-fire on the Homestead Grill have been pronounced the equal of charcoal broiled in every way.

Obviously, an easily controlled radiant gas grill has many advantages over the old-fashioned charcoal grill with its wasted heat, its attendant labor and its dirt and ashes.

Each section or unit is approximately twelve inches square. The main body of each unit comprises two square castings, resting one on the other, inside a band of polished blue block steel. The base casting carries the burner, bunsen and high temperature insulating material which prevents high bottom temperatures and forces the heat upwards towards the cooking surface. The upper casting contains eight specially designed heating elements similar to the radiants used in space heaters. These radiants function on a horizontal plane. Over the radiants is spread a refractory reproduction of charcoal. The grill proper or cooking surface is composed of two parts. The lower one rests on studs and has four channels that conduct the grease to the drip pan. Over 95% of the liberated grease is carried off in this way, thus providing a clean broil and eliminating to a large degree the smoke associated with broiling.

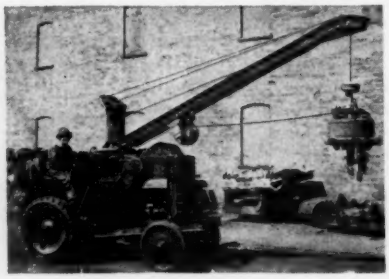
Being gas fired the grill has speed and flexibility. A slight movement of the gas cock is all that is necessary to control the heat so that the food is always exposed to the proper temperature.

It meets every requirement for broiling capacity, from the single unit in the lunch wagon to any number of units for the largest hotel and restaurant kitchens. Only the number of units necessary to meet broiling demands are kept in action. The grill is ready to broil in ten minutes from a cold start.

Single Section Homestead Grill

Improved Loadmaster Crane Unit Now Offered With Choice of Power

Announcement has just been made that the Loadmaster manufactured by Bucyrus-Erie Company, South Milwaukee, Wis., will now be available with either Case or McCormick-Deering power, and that the capacity of this crane has been further increased to 4500 pounds.



New Loadmaster

This Loadmaster with its increased capacity, has a wide variety of uses. It can be used as a stationary revolving-boom crane, as a crane traveling with its load, or as a tractor. Its extreme mobility, compact design, and the many items of special equipment available make it extremely handy for both indoor and outdoor work.

It lifts and swings or carries loads to points where needed. It will load and unload trucks and cars; sort and pile stored material; lift rock, pipe and transformers from and into manholes and trenches; serve machine tools; assist in overhauling and repair work. It is furnished with either wheel or crawler mounting.

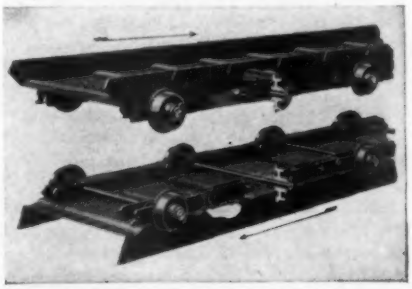
Descriptive material will be mailed on request to manufacturers.

Gravity Seal Steel Apron Conveyor

The Webster and Weller Mfg. Co., Chicago, Ill., are placing on the market a new type of apron conveyor, called the "Gravity Seal" Steel Apron Conveyor. The "Gravity Seal" feature is based upon a new method of attaching the conveyor pans to the chains by means of a patented Pivot Link. It is the operation of this link, in connection with several minor constructional features, that causes the pans to overlap so snugly as to eliminate

the possibility of leakage of material and yet provides sufficient flexibility to enable the conveyor to travel evenly and without strain around the sprockets.

The cross rods, mounted through the center of the chain links, are fitted with hardened bushings of unusual length. All roller parts may be quickly and easily replaced without unduly interfering with the operation of the conveyor. Each pair



"Gravity Seal" Apron Conveyor

of rollers carries the load of two full pan pitches on both the carrying and return run of the conveyor and rollers are idle only while apron passes over sprockets.

Split-Second Polaricode Supervisory Control

Westinghouse Electric & Manufacturing Company announces a new circular, C. 1948, describing the operation and construction of the new Polaricode split-second supervisory control. This system, employing a new simplified scheme of operation, it is claimed has as its chief advantage the ability to set up operating circuits in less than one second.

Booklet on Diamond Belt Conveyors

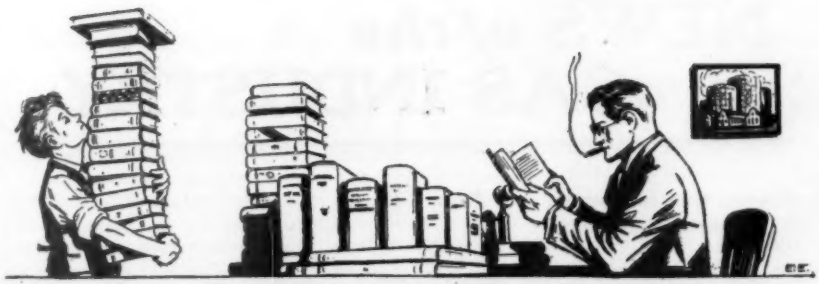
The Diamond Rubber Company, Inc., Akron, Ohio, have published a booklet entitled "How Shall We Handle It?" containing a number of photographs showing various applications of the belt conveyor in different industries. It also describes the Diamond Conveyor Belt construction.

Westinghouse Pays Quarterly Dividend on Preferred Stocks

Directors of the Westinghouse Electric and Manufacturing Company declared the regular quarterly dividend of 87½ cents a share on preferred stock and omitted the quarterly dividend of 25 cents on the common stock.

In view of the earnings situation of the company for some little time, it was the unanimous opinion of the directors that the company should conserve its cash resources and not further reduce the surplus by payment of any dividend on the common stock.

The company has no outstanding bonds or bank loans and is in very sound financial condition as to cash and net quick assets.



BOOK REVIEW

Valuable Text on Burner Design

In the June, 1932, issue of the Bureau of Standards Journal of Research will be found an excellent dissertation, "A Method for Determining the Most Favorable Design of Gas Burners," by *John H. Eisman, Elmer R. Weaver, and Francis A. Smith.*

This study, which is well illustrated by diagrams and curves, goes on to discuss the matters of primary air injected, burner ports, distance of vessel above burner, efficiency, size of orifice, flashback and other items closely identified with burner performance.

In the appendix will be found an outline of the iodine pentoxide method for determining small quantities of carbon monoxide in the products of combustion, application of the thermal conductivity method of gas analysis to the study of gas appliances, and burner testing apparatus used for supplying various adjustments of gas and primary air to a gas burner.

Specifically, the study is concerned for the most part with the top burner of a gas range burning a carburetted water gas of 570 Btu.

Principles of Public Utilities

The press of the Macmillan Co., New York City, has recently presented a new book entitled Principles of Public Utilities.

This book, in the words of the authors, *Eliot Jones*, Professor of Economics in Stanford University, and *Truman C. Bigham*, Professor of Economics in the University of Florida, "is designed to meet the needs of teachers and students of public utilities and to be of service to those interested in public utility problems, whether government officials, utility executives and employees, members of the various professions, such as editors, bankers, lawyers, and engineers."

Although entitled Principles of Utilities the scope of the book is limited to five; namely, electric, gas, water, telephone and street railway.

In the reading of this book one gets a very good bird's-eye picture of the utilities mentioned, their characteristics and the various phases of their business.

Besides giving a brief history of the utilities, the history and development of franchises and the regulation of service and securities by municipal, state, and federal commissions are outlined.

The question of rates and rates of return on capital are given the prominence that such items require while the matter of valuation, holding companies and municipal ownership are authoritatively dealt with.

The book is written in a manner that makes it easy and enjoyable reading and any member of the gas industry would do well to have this book in his library.

Price $6.00 per copy.

Geological Survey of Randolph County, W. Va.

Detailed Report on Randolph County, by *David B. Reger*, containing 989 pages + xxiv pages of introductory matter; illustrated with 74 half-tone plates and 30 zinc etchings in the text, accompanied by a separate case of topographic and geologic maps. Describes the geology and mineral resources of the largest county in the state. The new Cheat and Rich Mountain Coal Fields are described in detail as are also the other coal fields of the county, including chemical analyses, tests of fusing point of ash, sections, etc. Other mineral resources described are limestone, clay, building stone, glass-sand, and road material, with discussion of water-power resources, stream gaging records. Chapters of paleobotany and paleontology will be of particular interest to those engaged in the science of geology. The price of the volume and case of maps is $3.00. Extra copies of the geologic map, $1.00, and of the topographic map, $0.75. Copies may be obtained from the West Virginia Geological Survey, James D. Sisler, State Geologist, Box 879, Morgantown, W. Va.

Mixed Gas in St. Louis

Natural gas, mixed with manufactured gas, is now being served to all domestic gas users in St. Louis.

Rates for the new gas, as filed with the Public Service Commission, are to be about 7 per cent lower for general service and about 30 per cent for house heating.

NEWS of the GAS INDUSTRY

Rochester Gas & Electric Co. Now Controlled Locally

The Public Service Commission has approved a refinancing plan whereby control of the Rochester, N. Y., Gas and Electric Company, for three years in the hands of the Associated Gas & Electric Corporation, has been turned over to a group of Rochester business men and bankers.

In order to have a continuation of local representation on the board, a voting trust was created for the purpose of selecting, at each annual election, ten of the fifteen directors of the Rochester Gas & Electric Corp. The remaining five directors are to be selected by the Associated Group.

The new directors are: John P. Boylan, president, Rochester Telephone Corp.; M. Herbert Eisenhart, vice-president, Bausch & Lomb Optical Company; B. Emmet Finucane, president, Thomas W. Finucane Corp.; Fred C. Goodwin, chairman, Rochester Telephone Corp.; W. Roy McCanne, president, Stromberg-Carlson Telephone Manufacturing Co.; Edward G. Miner, president, Pfaudle Co.; J. Craig Powers, vice-president, Rochester Trust & Safe Deposit Co.; Charles W. Smith, vice-president, Union Trust Co.; R. L. Thompson, treasurer, University of Rochester; H. J. Wynn, president, Taylor Instrument Co.; Raymond N. Ball, president, Lincoln-Alliance Bank; Herman Russell, president, Rochester Gas & Electric Corp.; Charles M. Travis, counsel, Associated Gas & Electric Co.; Sanford J. Magee, vice-president, Associated Gas & Electric Co.; Fred S. Burroughs, vice-president, Associated Gas & Electric Co.

The voting trustees are Messrs. Ball, Goodwin, Wynn, and Travis, who are also directors of the company.

The Public Service Commission has ordered that the Rochester Company should not declare or pay common dividends unless and until it has amortized within not more than five years the discount incurred upon the sale of bonds conditionally authorized by the commission. The sale of $8,478,000 of general mortgage 5 per cent 30-year bonds not later than August 1, 1933, has been authorized.

State to Institute Suit

Suit for damages is to be entered by agencies of the State of Ohio against the Columbus Gas & Fuel Company, it was recently announced by the Attorney General. It is alleged that the explosion which wrecked a considerable portion of the new State Office Building was caused by leaking of gas from the main of this company into the premises. The State Office Building Commission, in charge of the erection of the structure, has authorized the Attorney General to institute suit for recovery of the full damages which were suffered by the State.

Change from Oil to Natural Gas

Changeover of equipment from oil to natural gas has just been completed at the Selby Smelter of the American Smelting and Refining Company.

Service to the plant is through a 6" and 4" line of the Coast Industrial Gas Company running from Crocket to Tormey. Changeover of equipment, installation of the necessary distribution system on the plant properties et cetera, has been carried on under the direction of K. B. Anderson, Manager of the Coast Industrial Company.

Under the new setup, natural gas will be used in all of the metallurgical operations at the smelter, which include the smelting and refining of lead, silver, gold and antimony, as well as the manufacture of sheet lead, lead shot and lead alloys. The plant operates practically the full 12 months of the year, employing a crew of approximately 200 men. Gas consumption is estimated to be in the neighborhoop of 240,000 MCF's per year.

Natural Gas is also now used at the East Helena, Murray, Garfield, Durango, El Paso, Omaha, Federal and Amarillo plants of the company.

New Ruling to Regulate Fees Paid to Holding Companies

Orders issued by the Alabama Public Service Commission recently, affecting more than 100 utilities in the state, provided for regulation of fees paid to holding companies and banned payment of common stock dividends unless and until earned. The orders became effective immediately, although the commission announced hearings would be set for any companies desiring to appear before it.

Under the commissioner's order, proof must be furnished that body in the future of any service rendered for which a fee is charged. It must further be shown that the fee charged is reasonable.

The second part of the order, referring to payment of dividends on common stock, provides that dividends shall not be paid until proof is furnished that the companies have made adequate and proper reserves for contingencies.

The order affects power, water, gas, electric, telephone and other utilities operating within the state. Companies affected were ordered to file by Sept. 1 detailed statements of each class of its fixed capital stock, the composite annual rate of depreciation required as an aggregate, and an estimate of reasonable reserves. The statement must be verified by affidavits.

Convention Calendar

August

24-26 Pacific Coast Gas Association, Hotel Del Monte, Del Monte, Calif.

25-26 Wisconsin Utilities Association Commercial Section Conference, Eau Claire Hotel, Eau Claire, Wis. John N. Cadby, executive secretary.

October

4-5 Indiana Gas Association, French Lick Hotel, French Lick, Ind. P A. McLeod Secretary-Treasurer.

10-14 American Gas Association, Atlantic City, N. J.

Cities Service Earnings Increase

Gross and net earnings of Cities Service Company for the month of June, 1932, were higher than those for June last year. Net to common stock and reserves increased 36%, and for both the second quarter and first half of 1932 show increases over the corresponding periods of 1931.

The St. Joseph Railway, Light, Heat and Power Company, a Cities Service Company subsidiary, closed a contract in June to electrify the oil pumping equipment used by Great Lakes Pipe Line Company.

Sales of refined oil products by Cities Service marketing subsidiaries for the first six months of 1932 show a slight increase over the similar period of 1931.

In June, subsidiaries completed 31 oil wells in the East Texas field, bringing the total for the first six months of 1932 to 129.

In the thirty days ended June 15, the number of holders of Cities Service Company common stock increased 3,695, bringing the total to 535,920.

Indiana Ruling Permits Stockholder to Inspect Books of Utility

The Indiana supreme court has ruled that any stockholder of a utility operating in the state has a right to inspect the books of the company upon demand. In a suit filed in superior court in Indianapolis the court ruled to this effect. The company appealed to the higher court and the stand of the lower court was upheld.

Canadian Gas Notes

United States consuls and trade commissioners at various Canadian stations report interesting developments on natural gas in the Dominion.

The corporation supplying Edmonton and Calgary with natural gas brought in June 10 a new well in the Viking field, 80 miles east of Edmonton, with a daily flow of 11,000,000 cubic feet of gas. This well is the first of four to be drilled in the Viking area in pursuance of an extension program undertaken by the company this season. The other three are to be completed before the end of the summer. Other points in the program are extension of main pipe lines, service and service line extensions and geological and exploratory work. (Consul Harold M. Collins, Edmonton.)

Attacks upon the validity of the first order issued by the Turner Valley Gas Conservation Board, made by the Spooner Oils (Ltd.) in the supreme court of Alberta, have failed. It was held by the court that the act did not infringe upon federal regulation of interprovincial trade, the General Order No. 1 of the Board was within powers granted by the legislature, and that it would be premature to grant an injunction against a tax levy which might never materialize. The court further found that the Spooner Company was bound by the implied terms of Dominion regulations affecting its federal lease to prevent waste, although no specific regulations of the sort were extant when the lease was granted in 1912. (Consul Samuel C. Reat, Calgary.)

The expected gas conservation bill was given the agricultural committee of the Alberta legislature April 2 and went through the final stages in the house April 5. This bill provides for the appointment of a board of three to supervise and control the field's resources, and puts into immediate effect a total maximum flow of 200,000,000 cubic feet a day, practically half the present flow. The board is empowered to fix production at any or all wells and restrict the flow to 100,000,000 cubic feet any time deemed necessary. Not later than October 1, 1932, the board must hold an inquiry to decide the effects of the legislation. (Assistant Trade Commissioners Allwin Probert, Winnipeg.)

Montreal Power Declares Regular Dividend

Regular quarterly dividend on the common stock of the Company was declared at a meeting of the Directors of Montreal Light Heat & Power Consolidated held recently.

The current dividend is the 64th quarterly payment to shareholders of the present organization and the 125th consecutive payment to shareholders since the incorporation of the original Montreal Light Heat & Power Company in 1901.

Century Since the Birth of Professor Lowe

On August twentieth will occur the centenary of the birth of Thaddeus Sobieski Constantine Lowe whose water gas process has contributed so much to the advancement of the gas industry. In the early eighties the Lowe Water Gas Process began to make its appearance, with not a little skepticism, at Phoenixville, Pa., Conshohocken, Pa., Columbia, Pa., and other places. The first installation in a large community was made in Baltimore in the early part of 1878. Although DuMotay and several others had been experimenting with water gas apparatus contemporary with or prior to the time Lowe brought out his process, to Lowe goes the distinction of being the father of successful water gas practice.

Lowe, who had a varied and distinguished career, which included balloon reconnoitering for the Union Army during the Civil War, lived to be an octogenarian and see his process or its offshoots occupying a powerful position in the manufacture of city gas.

Consumers' League Planned

Formation of a state-wide consumers' league comprising customers of the gas and electric companies of Georgia to cooperate with the Municipal Utilities Rate Association of Georgia in securing reduced rates on power and gas is being considered.

Following a mass meeting, held at the municipal auditorium recently, and addressed by Councilman J. W. Weaver, chairman of the special committee on reducing rates of the Atlanta city council, O. W. Franklin, of Valdosta, president of the rate association, James L. Mayson, city attorney for Atlanta, and others, plans were announced for the holding of similar meetings in other sections of the state and the formation of a consumers' league.

About 100 citizens attended the meeting, and the next meeting for the discussion of rate reductions will be held at East Point, Ga., it has been announced. The date for this meeting has not yet been set.

Change Resident Agent

Officials of the Northern Indiana Fuel and Light Company, having its main offices at Benton Harbor, Mich., have filed papers with the Secretary of State of Indiana changing the resident agent to L. B. Smith, Auburn, Ind.

Organized Brains

A powerful organization whose views on industrial problems are frequently solicited by the leaders of government and industry, is conducting a unique campaign.

The American Trade Association Executives, of 45 East 17th Street, New York City, is an organized group of several hundred trade association managers who represent many thousands of the progressive concerns in a large number of industries. Their job is one of leadership in trade promotion and stabilization, and their constant message to their membership is that only through cooperation can our present problems be solved.

The type of men in this organization closely follows the specifications recently laid down by Owen D. Young who stressed the need of broad-gauge executives as contrasted to the specialists who are limited in outlook. Association managers must decide and act upon the full range of industrial problems, although many have come up from the ranks of specialized activities.

Due to current conditions a number of these exceptional men, through no fault of their own, are available for new connections. They have banded together for the interchange of ideas and opportunities, and have laid out a comprehensive cooperative campaign for telling the business world about it. The entire trade press of the country is being enlisted, while progressive corporations and consulting specialists will be asked to call upon the Placement Committee to fill the need for new blood and new viewpoints in the planning of future programs.

This cooperative spirit and collective drive towards a common goal is an object lesson to those industries where cutthroat competition and volume at any price are demoralizing conditions and pushing business deeper into the mire of depression. Only in union is there strength and prosperity and jobs for anxious workers.

Seek Authority to Serve Gas of High Heat Content

The Northern Indiana Public Service Company has petitioned the Indiana public service commission for authority to introduce gas of high heat content in the cities of Hammond, Whiting, East Chicago and Munster. The company officials said that use of this type gas would save consumers about $40,000 a year. The gas which the company proposes to distribute in these communities will have a heating value of 1,000 British thermal units a cubic foot, compared with the coke oven gas now being sold, which contains 570 thermal units. The new gas will be a mixture of coke oven gas and petroleum refinery gas purchased from oil refineries. The mixed gas has been supplied for some time to a number of large industrial consumers in the Calumet steel district.

Forging Plants Beginning to Use Diffusion Flame Combustion

DESPITE the fact that factories are not making a general practice of installing new machinery at this time, ten large diffusion flame gas forges have recently been installed, according to an announcement of F. J. Rutledge, Chairman of the Committee on Industrial Gas Research of the American Gas Association. These forges represent the commercialization of the forging research conducted by Surface Combustion Corporation and University of Michigan for the Industrial Research Committee. The forges now in use have a total connected load of thousands of cubic feet per hour and enable the gas industry to offer its customers, probably for the first time, forging equipment for blanketing the work in gas and producing steel with a definite guarantee that scale will not exceed the strictest metallurgical limitations. Where press forging is used, this is of particular importance and of extreme value.

In addition to complete diffusion flame forges, burners that incorporate this new method of combustion, with or without the gas blanket feature, are available for converting existing forges to gas. It is said that a number of gas companies are making surveys of all forges in their territories for the purpose of determining the extent of improvements that can be made by replacing other fuels and crude gas forges with the new diffusion flame combustion equipment.

Utilities Power & Light Annual Report

In its first consolidated report of 1931 operations Utilities Power & Light Corporation shows that it has improved its financial position by recent financing to the extent of over $19,000,000 that the company owes no money to its subsidiaries other than $193,958, that none of the control common stocks of subsidiaries are pledged for loans, and that there are no bond or note maturities of the company or its subsidiaries prior to April 1, 1934. The only maturities of the system prior to 1938 are the following: $10,000,000 The Laclede Gas Light Company refunding and extension gold bonds due April 1, 1934; $3,000,000 The Laclede Gas Light Company gold notes due August 1, 1935, and $57,500 Eastern Iowa Electric Company first mortgage gold bonds due October 1, 1935.

Consolidated funded debt was $200,033,404 on Dec. 31, 1931, or $4,710,288 less than at the close of 1930.

For the corporation and its subsidiary and controlled companies the consolidated condensed surplus account at Dec. 31, 1931 showed a balance applicable to stocks of the corporation of $18,974,267, compared with $17,827,498 at January 1, 1931. Gross revenues received in 1931 were $51,574,143 against $53,097,390 in 1930, while net earnings before fixed charges were $21,704,660 against $23,247,106. Net income, including other net income of the corporation and of its non-utility subsidiaries, was $4,645,893 as compared with $7,236,840 in the previous year. This final net income was equivalent to earnings of $28.58 per share on the company's preferred stock, to $2.14 per share on the Class A stock, and to $0.12 per share on the Class B and Common. In 1930 the earnings on the preferred were equal to $44.53 per share, and after preferred dividends, to $4.08 per share on the Class A stock outstanding at the end of that year. After Class A dividends the earnings in 1930 equalled $0.95 per share on the Class B and Common.

Total assets are shown as $456,565,940, compared with $447,120,623 in the year 1930. Of these, current assets amount to $37,361,669 of which cash is $10,779,052, compared with current assets of $49,856,835 in 1930. Current liabilities amount to $30,341,912 as against $27,525,184 in 1930.

British Gas Executives to Visit United States and Canada Next Year

A large group of British gas executives and engineers will visit the United States and Canada next year for a tour of the two countries and to attend the annual convention of the American Gas Association. This announcement was made recently by R. W. Gallagher, president of the latter organization, who, with Hugh McNair, of Winnipeg, president of the Canadian Gas Association, extended an invitation to the British to visit America.

J. R. W. Alexander, secretary of the British Institution of Gas Engineers, has advised American Gas Association headquarters in New York that the Council of his organization, in accepting the invitation, plans to be here in September and October, 1933, with numerous gas men from England, Scotland, Ireland and from the Continent, in many cases accompanied by their wives.

Deep interest in every phase of the gas industry in America, its history, developments and achievements, its rate forms and industrial growth, and use of natural gas, was noted by President Clifford E. Paige and Managing Director Alexander Forward during their visit to the annual meeting of the Institution in London in June, 1931. According to Secretary Alexander, the members are looking forward with enthusiasm to their visit.

While the event is more than a year away, preliminary arrangements already are being made by leaders of the gas industry of the United States and Canada to receive and entertain the visitors.

Preliminary Convention Calendar American Gas Association

(The following calendar is printed for the purpose of acquainting Convention Delegates with meeting arrangements that differ from former Conventions. While some of the arrangements are tentative, delegates should note particularly that NO meetings will be held at the Atlantic City Auditorium. Main registration will be at the Hotel Traymore with subsidiary registration bureaus at Haddon Hall and the Ambassador Hotel.)

Monday, October 10

Registration will open at 9:00 a. m. at:
Hotel Traymore
Haddon Hall
Hotel Ambassador
Exhibit of Office Labor Saving Devices
—10:00 a. m.—Haddon Hall
Natural Gas Department Session
—2 p. m.—Ambassador
First Accounting Section Session
—2: p. m.—Haddon Hall
First Commercial Section Session
—2:00 p. m.—Traymore
First Industrial Gas Section Session
—2:00 p. m.—Traymore
First General Session
—8:00 p. m.—Traymore
Entertainment
—10:30 p. m.—Traymore

Tuesday, October 11

Registration will open at 9:00 a. m. at:
Hotel Traymore
Haddon Hall
Hotel Ambassador
Second General Session
—10:00 a .m.—Traymore
Second Accounting Section Session
—2:00 p. m.—Haddon Hall
Second Commercial Section Session
—2:00 p. m.—Traymore
Second Industrial Gas Section Session
—2:00 p. m.—Traymore
First Technical Section Session
—2:00 p. m.—Ambassador
Entertainment
—8:00 p. m.—Traymore

Wednesday, October 12

Registration will open at 9:00 a. m. at:
Hotel Traymore
Haddon Hall
Hotel Ambassador
Third General Session
—10:00 a. m.—Traymore
Publicity and Advertising Section Session
—2:00 p. m.—Ambassador
Second Technical Section Session
—2:00 p. m.—Ambassador

(News Continued on Page 46)

This ROBERTSHAW DISPLAY *is ready for you!*

SPEED UP YOUR GAS RANGE SALES this simple, sure way.

Write at once for the Robertshaw full color lithographed Display. As shown above, it is just the right size to place on a range or use in your window.

With this Display in use, you automatically extend an invitation to every woman coming in or near your store to have a visual demonstration of Robertshaw oven control.

It will pay you well to use this Display, for demonstrating the Robertshaw is the best way to make a woman think seriously about a new range.

And that is the kind of sales strategy you need right now. The Display is yours for the asking. Just drop us a line today.

ROBERTSHAW THERMOSTAT COMPANY
YOUNGWOOD · PENNSYLVANIA

10th National Exposition of Power & Mechanical Engineering Announced

It has been announced that 293 manufacturers of power producing machinery, mechanical devices for power transmission, precision instruments for the control of combustion, pressure, volume, flow and other measurable entity, material handling equipment, heavy electrical machinery, etc.. etc., will stage exhibits in the forthcoming Tenth National Exposition of Power and Mechanical Engineering at the Grand Central Palace, New York, during the week from December 5th to 10th, which is coincident with the annual meeting of the American Society of Mechanical Engineers. These manufacturers are now preparing exhibits and the large attendance which is expected of representatives from every state in the Union, as well as many foreign countries, will find things of considerable information and inspiration, ideas which will be of tremendous assistance to them in their work and plant operations. During the past two years, the interval since the 9th Exposition, a very considerable amount of research work has been carried on and completed and the results of this research work will be shown in this Exposition.

Gas Conservation Suffers Legal Setback

Federal courts have ruled recently that Texas cannot constitutionally require pipe line systems to become purchasers of all offered natural gas under all circumstances. The court has ruled that a private pipe line carrier which has not deliberately devoted its property to the public use for hire may not merely by legislative action be changed from the status of the private enterprise to that of a public carrier. The court says:

"While the act purports to conserve oil and gas as natural resources of the State, defendants concede that plaintiffs' operations do not result in waste. The State can not burden interstate commerce under the guise of police regulation."

New Mississippi Ruling on Drilling Operations

The State of Mississippi and counties may give leases to persons or concerns to drill for oil or gas on school lands but the lessor must obtain permission from the person holding any surface lease before beginning drilling operations the state supreme court has ruled. In other words if the land is leased out for farming purposes it would be necessary to negotiate with the farmer before drilling, although the farmer held no mineral lease.

The case arose in which the Gulf Refining Company of Louisiana obtained a lease on a piece of property near Jackson and began operations without obtaining consent of the owner of the surface lease. The company was enjoined by the court from further operations until it could come to terms with the holder of the ground lease.

New Holder Completed at Reading

There was recently completed for the Consumers Gas Company, Reading, Pa., a 4,000,000 cubic foot waterless holder of the Kloenne type. It is one of three holders of this type in this country, and the second largest of its kind in the world. The holder at Reading is unusually high in proportion to its diameter, due to lack of available ground area in the desired location. It is 279 feet high by 156¾ feet inside diameter.

Big Gas Well Reopened

The Montana public service commission in 1928 ordered the Bethal-Adams 77 million cubic foot gas well in the Kevin-Sunburst field closed because it was said to be injuring the production of oil in that field. Now the Dakota-Montana Oil Company has been given permission by the commission to reopen the well, the work to be done under the supervision of Engineer John Hall of the commission and results will be carefully watched and the future of this gas well depends upon results. It must not retard the oil flow from nearby wells.

File Articles of Incorporation

Articles of incorporation have been filed with the Secretary of State in Indianapolis by the Home & Manufacturers' Gas Company, Inc., of New Albany, Ind. The company is formed to develop gas properties and has 3,000 shares of stock of $10 each par value and 20,000 of no par value. The first board of directors is composed of Ellerbe W. Carter, C. E. Schindler and C. E. Mueller.

Louisville Gas & Electric Co. Earnings Show Decrease

Net earnings of Louisville Gas and Electric Company (Delaware) and Subsidiaries for the twelve months ended April 30, 1932, showed a decrease of 2.17 per cent, as compared with the previous twelve months. Gross earnings decreased 4.13 per cent.

Experienced Chemists Available

The Chemical Unemployment Committee, 300 Madison Ave., New York City, report they have 19 unemployed chemists and chemical engineers registered who have had one or more years of direct experience with industrial gases. The experience includes the following: analysis—combustion—research—equipment design—coke oven gas—heat transfer — helium — hydrogen sulphide—liquefaction—nitrogen—sulphur dioxide.

This presents an opportunity for the industry to obtain experienced, technically trained men that are not ordinarily available.

Since the first of the year the Committee has registered six hundred and eight (608) chemists and chemical engineers living within a radius of fifty miles of New York City and has located jobs for 130.

This is a cooperative committee and is sponsored by: American Chemical Society, (New York Section and North Jersey Section), American Institute of Chemists, American Institute of Chemical Engineers, American Electrochemical Society, Association of Consulting Chemists and Chemical Engineers, Inc., Societe De Chemie Industrielle (American Section), Society of Chemical Industry (American Section), Technical Association of Pulp and Paper Industry, American Gas Association, Compressed Gas Manufacturers Association.

Not Affected by Ruling

Standard Gas and Electric Company announces that the income of Northern States Power Company of Delaware is in no way affected by the recent ruling of the Wisconsin Public Service Commission respecting Northern States Power Company of Wisconsin and Interstate Light and Power Company as neither of these companies is paying dividends on its common stock.

Large Gas Consumer

The plant of Servel, Inc., Evansville, Ind., where the Electrolux Gas Refrigerator is manufactured, is one of the largest industrial consumers of gas in this section of Indiana. During the year 1931, over 85,161,000 cubic feet of gas were used in the factory for refrigerator manufacture. This gas consumption is used in heating ovens and other like appliances that are installed in the plant.

Answer to Starbuck's Rebus:—
"All-around men and not experts are now in demand."

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs

SUPERIOR
METER CO.
167-41st Street
Brooklyn, N. Y.

Manufacturers of GAS HOLDERS
and other major equipment units
for the GAS INDUSTRY

▼

CONDENSERS PURIFIERS
TANKS STACKS FLUES

CRUSE-KEMPER CO.
AMBLER, PA.

Personals

E. Frank Gardiner, director of advertising and publicity for the Midland United Company of Chicago who was recently elected president of the Public Utilities Advertising Association at its meeting in New York in conjunction with the annual convention of the Advertising Federation of America, was actively engaged in newspaper work for approximately twelve years and for the last eleven years has been in the public utility business.

Since 1923 he has been in charge of advertising and publicity for the Midland United Company and its subsidiary operating companies, which are located in Indiana and Ohio.

Mr. Gardiner has been active in public utility association work for several years. He served two years as a sectional vice-president of the American Gas Association, as chairman of the publicity and advertising section of that association. He is also a member of the publicity and advertising committee of the National Electric Light Association.

Norman C. Armitage, president of the Laboratory Club, Brooklyn Union Gas Co., is one of 18 men who is representing the United States in the Olympic fencing matches.

The Laboratory fencer has represented the United States in international contests on two previous occasions. He was a member of the 1924 Olympic team and of the U. S. team that met the British fencing team in 1930.

T. Warren, former manager of the Virginia Gas & Utilities Corp., at Pulaski and Radford, Va., has been appointed Sales Manager of the Eastern Division of the National Public Utilities Corp. Mr. Warren will make his headquarters at Havre de Grace, Md.

C. M. Sturkey, Southern Division Manager of the National Public Utilities Corp., has been elected Assistant Vice-President of the Corporation. Mr. Sturkey will make his headquarters at the Philadelphia office.

Walter I. Lukenbill, general records accountant, was elected assistant secretary of the Louisville Gas and Electric Company at a recent meeting of the board of directors. Mr. Lukenbill has been with the company for approximately twenty years.

T. H. Jackson has retired as Commercial Manager of The Philadelphia, Pa., Gas Works Company, due to ill health. Mr. Jackson entered the employ of the United Gas Improvement Company in 1890 and was later transferred to the Philadelphia Gas Works Company, where he remained until his retirement.

Emerson Collins, a member of the public service commission of Pennsylvania, has been requested by Governor Pinchot to resign. The commissioner has been ill for more than two years and unable to serve in his official capacity and the Governor bases his request on the necessity for securing prompt appointment of a successor capable of filling the office.

T. A. Kenney was recently elected president of the Consumers Power Company, Jackson, Mich. Mr. Kenney succeeds B. C. Cobb, who resigned to become president of the Commonwealth and Southern Corporation, of which Consumers Power Company is a subsidiary. Mr. Kenney has been connected with the Michigan properties since 1912.

Colonel Edward C. Rose, of Trenton, will be appointed a vice-president of Public Service Corporation of New Jersey and its affiliated operating companies, effective October 1st. He will be in charge of the Southern Division.

Colonel Rose has been a director of the parent corporation for more than a year and is now president of the First Mechanics National Bank of Trenton, which position he will relinquish.

F. M. Wilward Oliver has been elected Vice-President and General Manager of the Philadelphia, Pa., Gas Works Company.

P. T. Dashiell was recently elected Vice-President in Charge of Production of the Philadelphia Gas Works Company. Mr. Dashiell entered the service of the company in 1899 as a Cadet Engineer.

Walton Forstall has been elected Vice-President of the Philadelphia, Pa., Gas Works Company. Mr. Forstall will be in charge of distribution.

F. E. Benson was recently appointed local manager of the Community Natural Gas Co., at Greenville, Texas.

Obituary

Alfred H. Humphrey

Alfred H. Humphrey, President of the General Gas Light Company, Kalamazoo, Mich., died at La Jolla, California, on July 8th.

Mr. Humphrey was one of the pioneers and constructive men of the gas industry. He was quick to sense the needs of the industry and created original gas appliances which proved their practical value to the public. One of his early inventions was a photograph roller. It was heated by a gasoline Bunsen burner, original in construction and unique in application, as it was necessary to promote combustion on the inside of the rollers. Up to that time photographs were all hand ironed.

Alfred H. Humphrey

It was in 1893 that Mr. Humphrey organized the Humphrey Company and invented the Humphrey instantaneous water heater.

In 1901 he withdrew from the Humphrey Company and organized the General Gas Light Company, which developed his invention, the Humphrey Upright Gas Arc Lamp, which was the first gas arc lamp in the world. He later developed an upright outdoor arc lamp and factory lamp, which made possible successful factory and outdoor gas lighting. In 1907 he patented and introduced the first inverted gas arc lamp made. In this connection, he also developed a method of distance control of arc lamps which made possible the turning on and off of lamps at a distance.

In 1916, Mr. Humphrey perfected and introduced the Humphrey Radiantfire. This was the entering wedge which made the gas industry heat conscious and educated the public to the value of gas as a fuel.

In 1928 he introduced the Humphrey Unit Heater, which using gas as a fuel, was particularly adapted for the heating of factories, warehouses, auditoriums, stores, etc.

Mr. Humphrey was born in England in 1858. In 1874, he emigrated to Canada and in 1886 he moved to Ypsilanti, Michigan, where he established a machine shop.

The General Gas Light Company is a fitting memorial to his years of achievement and the business will now be carried on under the able leadership of his sons, Hubert and George of Kalamazoo, Michigan, and Harold Humphrey of New York.

BAROMETERS

PHILADELPHIA, THE WORKSHOP OF THE WORLD

has 14,000 Manufacturing Establishments of which many have World-Wide Reputations.

"PRINCO" STANDARD FORTIN MERCURIAL BAROMETERS

are in World-Wide use because they, too, have a "World-Wide Reputation"

THEY ARE GOOD BAROMETERS
THEY ARE REASONABLE IN PRICE

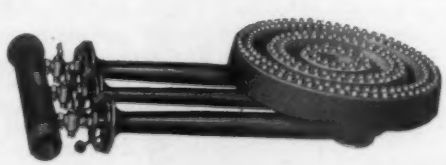
For more than a decade they have been made in such manner that they can be shipped safely and successfully wherever there is a common carrier. This has been recognized as an achievement in Barometry.

PRECISION THERMOMETER & INSTRUMENT COMPANY

1439 BRANDYWINE STREET - - - - - PHILADELPHIA, PA.

EFFICIENT BURNER INSTALLATIONS

For unusual gas heating jobs let Johnson design a special burner to meet your exact requirement. Nothing too big or too small. Drilled pipe burners, ring burners, powerful bunsen burner assemblies. Whatever you need—Johnson has it, or can build it. Send us your problem.



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Cedar Rapids IOWA

Eastern Representatives

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Steinmetz & Co., 220 So. 16th St., Philadelphia, Pa.
30 Church Street, New York

TEEPLE MOTORIZED GAS VALVE

The highest type of control for domestic gas-fired heaters.
WRITE FOR LITERATURE & PRICES

L. R. TEEPLE CO.
Portland, Oregon

TEEPLE SPECIALIZED GAS CONTROLS

THROUGHOUT THE WORLD TEEPLE SPECIALIZED STOKER CONTROLS OPERATE THE FAMOUS IRON FIREMAN... THE MACHINE THAT MADE COAL AN AUTOMATIC FUEL

TRADE NEWS

United Engineers & Constructors, Inc.—Activities

The Harrisburg Gas Company, Harrisburg, Penna., has awarded contract to furnish and install at Steelton, Penna., one 9'0" I. D., U. G. I. Mechanical Generator Blue Water Gas Apparatus, and auxiliary equipment.

The Syracuse Lighting Company, Inc., of Syracuse, N. Y., has awarded contract to furnish all labor, supervision and construction tools and equipment, also construction materials to construct approximately 71,200 feet of 18" Dresser coupled steel main from Brewster St., and Willis Ave., Village of Solvay, N. Y., through the village of Solvay to Onondaga Township Line, N. Y.

Arnesen to Seattle

Announcement has been made that Fred Arnesen, district manager of the Dallas office for the past two years, has been transferred to assume the duties of manager of the Pacific Northwest territory with headquarters at Seattle.

"Fred's long experience in selling both water and gas meters well warrants this promotion. While his many friends in the southwest will regret his leaving, they will be glad to learn of this advancement.

In addition to selling both water and gas meters, Arnesen will represent the Merco Nordstrom Valve Company, sibsidiary of the Pittsburgh Equitable Meter Company, in that territory. His experience in the gas and water industries makes him well qualified to sell Nordstrom Lubricated Plug Valves.

New R-C-W Bulletins

Roots-Connersville Wilbraham, Connersville, Ind., have issued four new bulletins.

Bulletin 21-B20 covers an application of Victor-Acme Blowers in furnishing vacuum on steam garment presses to remove surplus steam.

Bulletin 21-B21 covers an application of Victor-Acme Blowers in furnishing vacuum for cleaning and drying barrels, drums, and tanks.

Bulletin 21-B22 covers an application of R-C-W Vacuum Pumps, of different types, in priming centrifugal pumps, especially large sizes.

Bulletin 21-B23 covers an application of Victor-Acme Blowers to blowing units in specialized service, of which two are illustrated.

Heads Petro Gas Equipment Division

John B. Allington, who for fifteen years was in charge of the gas heating and industrial gas department of the Rochester Gas and Electric Corporation, has been appointed director of the gas

John B. Allington

equipment and gas air conditioning division of the Petroleum Heat and Power Company, with headquarters at Stamford, Connecticut. Mr. Allington is a mechanical engineer, a graduate of Cornell University, and has been active in developing gas burning equipment during the early years of its application, especially warm air gas furnaces. He has been a member of the American Gas Association committee on Industrial Gas Research and Industrial Gas Utilization, and the committee on Specifications and Performance Requirements for Central House Heating Appliances, since their formation.

Mr. Allington is now developing a new line of air conditioning furnaces for either oil or gas fuel. A new Petro automatic gas conversion burner has just been placed upon the market, which incorporates many advanced features in its design.

New Worthington Catalogs

The Worthington Pump & Machinery Corporation, Harrison, N. J., have recently published the following catalogs, bulletins, etc.

Portable Compressors, and Contractors Air Tools—4-page bulletin W-850-B8 illustrating complete line of equipment and explaining dealer franchise.

Rock Drills—4-page bulletin W-1201-S1A describing hand-held drills for light, medium and heavy duty.

Hydraulic By-pass and Check Valves—2-page bulletin D-445-S2, showing cross-section views and listing sizes and capacities.

Power Pumps for Marine Boiler Feed Service, compact vertical type with motor mounted overhead, for pressures up to 500 lb.—4-page bulletin D-423-S14.

Steam Pumps for Marine Service, vertical simplex type—8-page bulletin D-121-S3 for pressures up to 75 lb.; 4-page bulletin D-121-S2 for pressures up to 350 lb.; D-121-S1 for pressures up to 600 lb.

Steam Pumps for Highly Volatile Liquids—8-page bulletin D-111-S4 describing the HiVol close clearance pump and giving simple method for calculating the actual clearance of any steam pump.

Copies of these bulletins will be sent upon request.

N. W. Foy Appointed Chicago Sales Manager for Republic Steel

Norman W. Foy has been appointed Chicago District Sales Manager of Republic Steel Corporation, according to an announcement made recently by N. J. Clarke, Vice-President in Charge of Sales.

Mr. Foy became associated with the old Republic Iron and Steel Company as a salesman in 1919. He was subsequently manager of the company's Buffalo, Boston and Birmingham offices, being made Ass't Western Manager of Sales shortly after the formation of the present Republic Corporation.

Mr. Foy will continue to make his headquarters at Republic's district sales offices in the McCormick Building, Chicago.

New Tinnerman Range

The Tinnerman Stove & Range Company, Cleveland, Ohio, have just issued a circular describing and illustrating their new range called the "Centrole." One of the features described is the all-aluminum burner box, which it is claimed, adds greatly to the convenience of cleaning this section of the range and also lends speed to the cooking due to positive reflection of heat by the polished aluminum surfaces. It is also claimed the top burner automatic lighting, together with concentrated control of valves, brings all of the ease of control of electrical ranges, and still retaining the speed and efficiency of gas as a fuel.

Copies of this circular may be obtained upon request.

"New Taylor-Forge" Booklet"

A new booklet entitled, "Taylor Forge" has just been issued by the Taylor Forge & Pipe Works, Chicago, Ill., containing photographs and descriptions of the various types of Taylor pipe and fittings.

Lux Material

Guaranteed to always run uniform. It has been used by Gasworks all over the world for nearly 50 years. We offer same from a shipping point most conveniently located to your works. Shipped in bulk or bags.

Lux-Sponge

THE PERFECT READY MIXED OXIDE

For Gasworks having no facilities to mix their own Sponge we offer our celebrated "Lux Sponge," guaranteed efficient for Coal or Water Gas.
Samples upon request.

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192 FRONT STREET - NEW YORK CITY, N. Y.

Philadelphia Office: 2767 Gaul St.

ISBELL-PORTER COMPANY

Engineers and Contractors for Complete Gas Works

I-P C

Manufacturers of All Kinds of Gas Apparatus

NEWARK · NEW JERSEY

LEADING GAS COMPANIES USE LAMBERT METERS

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

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BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

Byllesby Engineering and Management Corporation

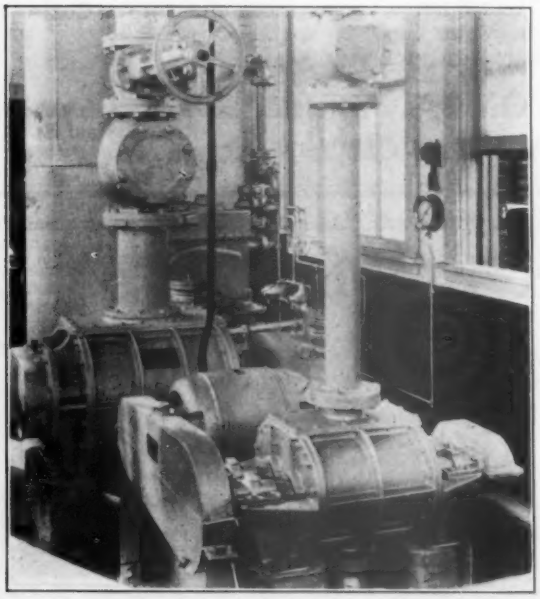
Wholly-owned subsidiary of

Standard Gas and Electric Company

231 South La Salle Street, Chicago

New York Pittsburgh San Francisco

PROPORTIONING EQUIPMENT



R-C-W Blower and Exhauster being used for proportioning at San Diego, Calif.

R-C-W Blowers and Exhausters are being used successfully in proportioning gas mixtures, like the installation above.

There are many applications for R-C-W proportioning equipment of this kind.

In the installation at San Diego, Calif., the R-C-W Blower and Exhauster contribute to increasing this oil gas plant's output by 35%. At the same time, the total cost of the installation is about 25% of the estimated cost of an oil gas installation of the same capacity, according to the owners.

Many plants, confronted with the necessity of increasing output, while economizing on investment in new equipment, will find it advantageous to investigate.

Our sales engineers will be glad to make a survey as to how you can use R-C-W equipment in your plant.

Address the factory or nearest sales office

ROOTS-CONNERSVILLE-WILBRAHAM

12th & Columbia — CONNERSVILLE, IND.

ST. LOUIS • DALLAS • SAN FRANCISCO

NEW YORK CHICAGO

ROTARY POSITIVE RCW CENTRIFUGAL

TRADE CATALOGS

Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 58.

PLANT EQUIPMENT

"AMERICAN" GAS AND METER TESTING APPARATUS
American Meter Co. 320

AUTOMATIC GOVERNORS
Connelly Iron Sponge & Governor Co. 289

BALANCE GOVERNORS
Connelly Iron Sponge & Governor Co. 290

BACK PRESSURE VALVES
Connelly Iron Sponge & Governor Co. 295

BASE PRESSURE INDEXES
American Meter Co. 725

B. H. CO. OSCILLATING CONTINUOUS FILTER
The Bartlett Hayward Co. 701

B. H. CO. THICKENER
The Bartlett Hayward Co. 56

B. H. CO. VERTICAL SCRUBBER
The Bartlett Hayward Co. 57

B. H. CO. FELD TYPE SCRUBBER
Bartlett Hayward Co. 713
Co. 580

"BULLETS"—HOLDERS
Stacey Bros. Gas Constrn. Co. 560

BUTANE PLANT EQUIPMENT
Philgas Co. 510

CALORIMETRY
American Meter Co. 321

CALOROPTIC, THE
Connelly Iron Sponge & Governor Co. 511
Centrifugal Blowers and Compressors 726

CHEMICAL ANALYSIS OF GAS PURIFYING MATERIALS
E. J. Lavino & Co. 455

CHEMISTRY AND PHYSICS OF THE COMBUSTION OF GASEOUS FUELS
E. J. Lavino & Co. 456

CONNELLY COMBINATION VALVE
Connelly Iron Sponge & Governor Co. 610

CONNERSVILLE ROTARY DISPLACEMENT METERS
Roots-Connersville-Wilbraham 727

CONTROL MECHANICAL APPARATUS
Western Gas Construction Co. 581

COUNTER BALANCE MANHOLES
Connelly Iron Sponge & Governor Co. 299

DISTRICT L. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 293

DR. OTT-LUX-GAS TESTER
The Alpha Lux Co., Inc. 23

DUPLEX VALVES
Andale Co. 45

FAST S FLEXIBLE COUPLING
The Bartlett Hayward Co. 54

FLOWMETERS
American Meter Co. 728

FULTON DEAD WEIGHT SAFETY VALVES
Chaplin-Fulton Mfg. Co. 480

FULTON LEVER SAFETY VALVES
Chaplin-Fulton Mfg. Co. 479

GAS CONDENSERS
Isbell Porter Co. 140

GAS COOLER
Andale Co. 46

GAS DISTRIBUTION
The U. G. I. Contracting Co. 654

GAS FILTERS
American Meter Co. 322

GAS PURIFICATION PROCESS
Western Gas Construction Co. 585

GAS HOLDERS—HIGH AND LOW PRESSURE
Stacey Mfg. Co. 579

GAS MEASUREMENT
American Meter Co. 323

GATE VALVES
Western Gas Construction Co. 586

GAS WORKS APPARATUS AND EQUIPMENT
Connelly Iron Sponge & Governor Co. 627

HAND COLORIMETER
The Alpha Lux Co., Inc. 22

HIGH EFFICIENCY GAS CONDENSERS
Isbell Porter Co. 137

HIGH TEST WELDING ROD
Union Carbide & Carbon Corpn. 255

JET PHOTOMETERS
Connelly Iron Sponge & Governor Co. 298

KEEPING UP WITH INDUSTRY
Cruse Kemper Co. 457

KENNEDY AUTOMATIC CONTROL
The Bartlett Hayward Co. 55

LABORATORY APPARATUS
American Meter Co. 324
Superior Meter Co. 521

LUX RECORDING GAUGE
The Alpha Lux Co., Inc. 21

MACKENZIE EXHAUSTERS
Isbell Porter Co. 653

MANUAL OF DRY BOX PURIFICATION
E. J. Lavino and Co. 276

MERCURY SEAL GOVERNORS
Connelly Iron Sponge & Governor Co. 291

METERS, GAS
American Meter Co. 326
braham —
International-Stacey Corpn. 702
Roots-Connersville-Wil-
Sprague Meter Co. 710
Superior Meter Co. 522

"METRIC" IRONCASE METERS
American Meter Co. 325

"METRIC" DIFFERENTIAL VALVES
American Meter Co. 729

"METRIC" INTEGRATING ORIFICE METERS AND FLOWMETERS
American Meter Co. 730

OBSERVATION ON LUX-MATERIAL
The Alpha Lux Co., Inc. 24

ORIFICE METERS
American Meter Co. 327

PRESSURE GAUGES
American Meter Co. 378
Connelly Iron Sponge & Governor Co. 296
Superior Meter Co. 525

PRESSURE VACUUM RELIEF VALVE FOR STORAGE TANKS
International-Stacey Corpn. 642

RELIANCE SERVICE REGULATORS
American Meter Co. 731

ROADLESS BARROWS
Isbell Porter Co. 655

ROTARY SELF-CLEANING STRAINER
Andale Co. 656

SECTIONAL SIDE-WALL CONSTRUCTION
International-Stacey Corpn. 643

SERVICE CLEANERS
American Meter Co. 657
Superior Meter Co. 521

SERVICE GOVERNORS
American Meter Co. 732
Connelly Iron Sponge & Governor Co. 658

SERVICE D. C. GOVERNORS
Connelly Iron Sponge & Governor Co. 294

SEMET-SOLVAY KOLLER TYPE GAS PRODUCER
Semet Solvay Engineering Corpn 714

SHAVING SCRUBBERS
Isbell Porter Co. 138

SPECIFICATIONS ON HIGH AND LOW PRESSURE HOLDERS
The Stacey Bros. Gas Constrn. Co. 74

"STACEY BULLET"
The Stacey Bros. Gas Constrn. Co. 73

STACEY-KLONNE DRY GAS HOLDERS
Stacey Bros. Constrn. Co. 644

STANDARD HOLDERS FOR LOW PRESSURE STORAGE
Western Gas Construction Co. 580

STANDARD STEEL BUILDINGS
International-Stacey Corpn. 645

STEEL DERRICKS AND ACCESSORIES
International-Stacey Corpn. 646

STREET DEPARTMENT TOOLS
Connelly Iron Sponge & Governor Co. 297

STREET MAIN GOVERNORS
American Meter Co. 733

THROTTLE GOVERNORS & COMPENSATORS
American Meter Co 734

(Continued on page 54)

BILLIONS *of* DOLLARS

for

dependable employment

LARGE sums of money have been mobilized through the open market operations and the loan and discount facilities of the Federal Reserve Banks, and by loans through the Reconstruction Finance Corporation.

Here is a great credit reserve—totaling billions of dollars—awaiting dependable employment.

Just as fast as suitable jobs can be found for this credit, confidence will be strengthened, trade will quicken, and men will be returned to work.

To help speed the effective employment of this huge army of credit dollars, committees of leading industrialists and bankers have been appointed by the Governors of the twelve Federal Reserve Banks—Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, St. Louis, Dallas, Kansas City, Minneapolis and San Francisco.

Like the divisional staffs of a great army, these committees will work to consolidate our position, and straighten and strengthen our lines, so that a broad advance can be made.

Theirs is no simple task, but the readiness with which these industrial and banking leaders are joining together, and cooperating with national authorities, is a very encouraging factor in the present situation.

★ ★ ★

Housing Construction — An Opportunity

In previous depressions, a resumption of construction activity has been an important and vital factor in encouraging and stimulating business improvement. It assures employment of large numbers of men, not only directly, but also in the industries of supply.

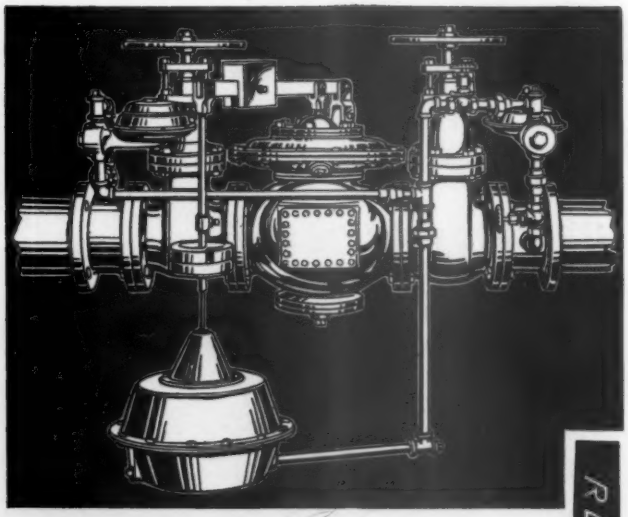
There is undeniably an opportunity in many communities for construction of homes on a sound and economic basis, as well as a definite need for home repairs and improvements, and these matters will undoubtedly have early consideration.

The bringing together of worthy domestic building projects and substantial financing is typical of the many possibilities for beneficial action open to these committees in a wide range of fields.

The National Publishers' Association

"As the most nearly self-contained nation, we have within our own boundaries the elemental factors for recovery."

(From the Recommendation of the Committee on Unemployment Plans and Suggestions of the President's Organization on Unemployment Relief)



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POSITIVE PERFORMANCE

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Anderson, Indiana, U. S. A.

GAS CONTROL SINCE 1892

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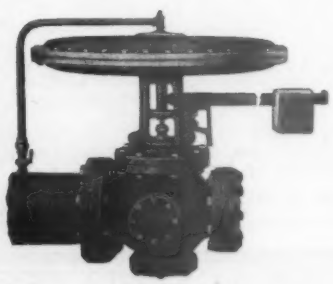

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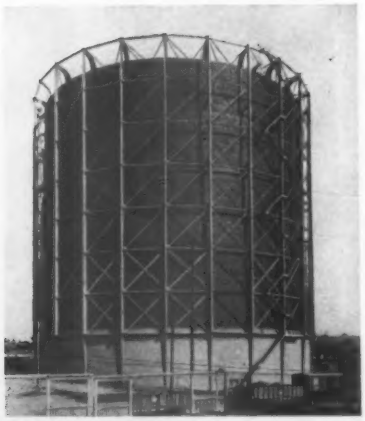

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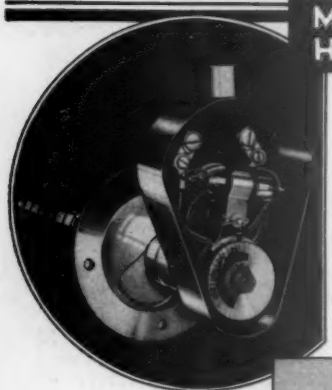

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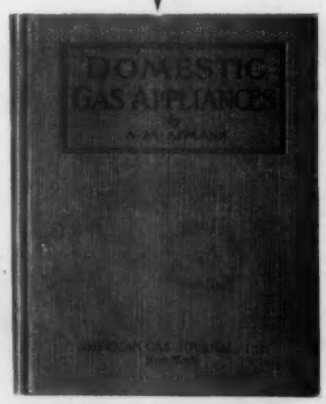

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XVII. The Future of Gas Utilization
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